

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 5, 1945



Rare Triplets
See Page 8

A SCIENCE SERVICE PUBLICATION

MEDICINE

Penicillin in Lozenges

Letting it dissolve in the mouth like cough drops found to be effective method of treatment for strep throat and trench mouth.

➤ GIVING PATIENTS penicillin lozenges to dissolve in their mouths like cough drops is an effective method of using the mold chemical to combat strep sore throat, trench mouth and other mouth and throat infections, two British scientists, Dr. Alexander B. MacGregor and Dr. David A. Long, report.

Pain, fever and disease germs were banished in 24 hours in some cases. All the trench mouth patients, 25 at the time of the report, were free of symptoms within 24 hours, and within five days their mouths had completely healed and they could stop the medicine. Up to three and one-half months later there were no relapses, although the British doctors point out that procedures to eliminate gum pockets and stagnation areas will be necessary to prevent reinfection at a later date.

In cases of acute streptococcal tonsillitis there was "great relief" in 24 hours and within 48 hours all the patients were free of fever. A grown person severely ill with scarlet fever began taking solid food within 24 hours after the lozenge treatment was started.

No other treatment was given, not even mouth washes, to these and the trench mouth patients.

Hope that the lozenges might clear up the chronic carrier state was doomed to disappointment, however. Streptococcus

germs were banished from the throats of the carrier while they were taking the lozenges, but in most of the patients the germs returned soon after the treatment was stopped. A medical student, however, was kept free of the carrier state long enough to finish his training in obstetrics, which the doctors point to as of practical value.

The lozenges also proved effective in combating germs in surgical cases such as tonsillectomies, tooth extractions and the like.

The lozenges, three-fourths of an inch square by one-eighth of an inch thick, are made of gelatin and penicillin with a small amount of preservative. They have a "very slightly bitter taste" which apparently is not noticeable when there is any infection in the mouth or throat. Well persons who tried the lozenges did not find the bitterness "actively unpleasant."

The lozenge is put in the cheek and left there to dissolve without chewing or sucking. As soon as one has entirely dissolved, the patient takes another. One is taken at bedtime and during the night if the patient awakens. One patient by mistake ate 10 of them during the first five minutes of treatment, but otherwise there was no trouble getting patients, even children, to take the lozenges as directed.

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actively growing and functioning zones of roots are normally able to keep up their activities despite the presence in the soil of germs known to be capable of killing them; (2) folk medicine (usually regarded as more or less superstitious) prescribes a great variety of "herbal" extracts, poultices, etc., as "good" against many kinds of infection.

The researchers comment:

"The results obtained so far indicate that a wide field is opening up for exploration. In all probability, the problems to be encountered will be of a general biological nature rather than being confined to the inter-relations between bacteria and higher plants. Broader aspects are coming into the picture, heretofore merely touched but not yet developed."

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CHEMISTRY

Million Organic Compounds Obtainable from Crude Oil

➤ MORE than a million new organic compounds may be produced in the future from petroleum and natural gas, declared Dr. Gustav Egloff of the Universal Oil Products Corporation of Chicago before the Los Angeles section of the American Chemical Society. "Petroleum refining," he said, "is becoming more and more a chemical industry."

Natural gas and petroleum, he stated, are veritable treasure troves of paraffin, olefin, acetylene, cycloparaffin, cycloolefin, and aromatic hydrocarbons that open vast vistas in chemical research which have been only faintly explored. Individual compounds, such as isopentane, isooctane, triptane, isobutylene, butadiene, toluene, and styrene, and chemical compounds such as phenols, cresols, organic acids, resins, plastics, explosives, synthetic rubber, and many other derivatives are being produced from petroleum.

The industries based on the newer petroleum chemistry, involving aliphatic hydrocarbons as base materials, have infinitely greater possibilities than the industries based on coal tar chemistry, he declared, even though it is estimated that coal tar has served as a source of 500,000 derivatives. Coal-tar hydrocarbons are mainly aromatic in character, and this limits the number of derivatives which can be produced from them.

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The best bath sponges come from the Mediterranean coast, Australia, Bahama, Florida, and the north coast of Cuba.

BIOCHEMISTRY

Germ Stopper in Leaves

➤ PENICILLIN-LIKE substances, hostile to germ life, may be found in leaves, fruits and other organs of a wide range of higher plants, as well as in lower plants like the molds, bacteria and algae that have until now been their only known sources. Evidence on this point is offered by E. H. Lucas and R. W. Lewis, research workers at Michigan State College of Agriculture and Applied Science. (*Science*, Dec. 29.)

The two men found antibiotics (germ-stopping substances) in the leaves of

Scotch thistle, mullein and peony, and in the fruits of blueberry, currant, mountain-ash and honeysuckle. One species of honeysuckle even had two distinct antibiotic substances in its berries.

Not all plants, however, yielded extracts with antibiotic properties. Only negative results were obtained from horseradish, turnip and several varieties of cabbage.

The two investigators were induced to undertake their research by two hints in existing botanical knowledge: (1)

MEDICINE

Paralysis Relieved

Muscle function is restored in patients crippled by arthritis and injury or infection by injections of synthetic chemical, neostigmine.

ENCOURAGING results with a new treatment to restore muscle functioning in patients crippled by paralysis, rheumatoid arthritis and injury or infection are reported by Dr. Herman Kabat, of the U. S. Public Health Service. (*Public Health Reports*)

An elderly woman confined for six years to bed and wheel chair because of rheumatoid arthritis was able after two weeks of treatment to stand up and walk.

A man paralyzed on his right side for 12 years was able, 24 hours after starting the treatment, for the first time in many years, to touch the top of his head, the opposite shoulder, the opposite buttock, his mouth, chin, put a cigarette in his mouth, lift his shoulder blade and move his hip. After one month of treatment he could stand up straight with both heels on the ground, both knees straight and only slight humping of his back.

The treatment that brought about these and similarly striking improvements in other patients when other treatment had failed consisted in injections under the skin once or twice a day of neostigmine. This synthetic chemical is also known as prostigmine. It has for some years been used successfully to relieve the fatigue and muscle weakness of myasthenia gravis.

Dr. Kabat and Dr. M. E. Knapp, of the University of Minnesota Medical School, in 1943 reported trying it in the treatment of infantile paralysis. They found it produced relaxation of muscle spasm, relief from pain, increase in strength and improvement in muscular coordination in the polio patients. This and other studies suggested to Dr. Kabat that it might prove effective in a variety of conditions in which failure of nerve muscle functioning was causing limping and disability.

So far he has tried it in 53 patients. Some had muscle spasm, contracture, joint weakness, pain and muscular weakness persisting for a long period after sprains, fractures and other injuries or after chronic infection. Some had hemiplegia, which the layman calls a paralytic stroke. Some had Bell's palsy. Others

had facial paralysis. Included in the group were five patients with the spastic type of cerebral palsy. Rheumatoid arthritis and bursitis of the shoulder were the other conditions.

"Improvement in range of motion, relief from pain and increase in strength and endurance may occur rapidly," Dr. Kabat reports.

What percentage of patients suffering from these conditions can be helped by the neostigmine treatment cannot be stated at present. Further study is needed to determine this. Patients in whom active inflammation, loss of innervation or bony or fibrous consolidation of a joint is the primary cause of the disability cannot be expected to benefit from the treatment.

"The results have been encouraging enough to warrant further investigation," Dr. Kabat states, adding that an evaluation of the treatment is now being made.

How neostigmine achieves its results is not definitely known. It is known to act on the central nervous system to inhibit or block nerve messages that would cause spasm and excessive tone or tension of muscles.

It may also facilitate formation of new pathways in the central nervous system. Such formation of new pathways for messages to and from muscles is generally considered part of the mechanism of recovery of function following brain damage and resulting paralysis. In these cases the possibilities of neostigmine proving effective will be distinctly limited, Dr. Kabat points out. It can only help within the limits imposed by the irreversible brain damage and the possibilities for formation of new nerve pathways to the abnormally functioning muscles.

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GENERAL SCIENCE

New AAAS President Is Dr. C. F. Kettering

➤ DOCTOR Charles F. Kettering, vice president of General Motors Corporation and chairman of the National Inventors Council, was elected president of

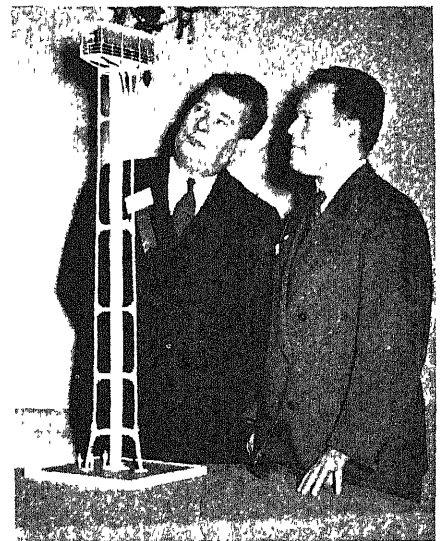
the American Association for the Advancement of Science

A scientific session of the Association was held in September for the first time since the war, but the election of officers did not take place at that time. The usual time for the annual meeting of the Association is during Christmas week.

Dr. Kettering, inventor of the automobile self-starter, is one of the American pioneers in the development of robot airplanes. (*See SNL, July 8, 1944.*)

Newly elected vice presidents of the various sections of the AAAS are as follows:

Mathematics, Dr. E. P. Lane, University of Chicago. Physics, Dr. R. C. Gibbs, Cornell University Chemistry, Dr. Henry Eyring, Princeton. Astronomy, Dr. J. J. Nassau, Case School of Applied Science. Geology and Geography, Dr. Arthur Beven, University of Virginia. Zoology, Dr. Carl G. Hartman, University of



TELEVISION relay tower that will receive and transmit several types of messages at the same time is exhibited here to Walter S. Lemmon, general manager of the Radiotype Division of the International Business Machines Corp., left, by Paul L. Chamberlain, manager of General Electric transmitter division. This is a model of the actual transmitter that will be built to send and receive all at one time automatic teletypewriter messages; facsimile which prints pictures and words on paper exactly as they are sent; FM, the means of broadcasting that is static free; and television programs. The tower was designed by I.B.M. and General Electric engineers.

Illinois. Botany, Dr. F. D. Kern, Pennsylvania State College. Anthropology, Dr. A. Irving Hallowell, Northwestern University. Psychology, Dr. Florence Goodenough, University of Minnesota. History and Philosophy of Science, Dr. John F. Fulton, Yale University. Engineering, George A. Stetson, editor, *Mechanical Engineering*. Medical Sciences, Dr. Warfield T. Longcope, Johns Hopkins University. Agriculture, Dr. William Albrecht, University of Mis-

souri. Education, Dr. H. H. Remmers, Purdue University.

Dr. Otis Caldwell, Boyce Thompson Institute, is general secretary of the AAAS; Dr. F. R. Moulton is permanent secretary and Director William E. Wrather, U. S. Geological Survey, is treasurer.

Newly elected members of the executive committee are Dr. A. J. Carlson of the University of Chicago and Dr. Walter R. Miles of Yale University.

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CHEMISTRY

Three Sources of Water

➤ MEN ADRIFT on a life raft now have three sources of fresh drinking water, thus bringing to a successful solution a situation which for centuries has posed a rough problem for men who battle the seas.

The most abundant source of drinking water is rainfall. Rain is caught in tarpaulins and transferred to an empty food tin or other receptacle for drinking.

However, the weather man cannot be counted upon to supply rain whenever men need a drink. Frequently men adrift on the sea are exposed to the hot, parching rays of the sun for days on end. Realizing this, Army Air Forces scientists set to work to find a way to use the sun's rays to take the salt out of sea water. The result was the solar still. Today, as long as the sun shines bright, and there's water in the sea, no castaways adrift need perish from thirst.

The solar still is a vinyl plastic envelope, 30 inches long with rounded ends 12 inches across. A plastic screen covered with black cellulose sponge is stretched through the middle. About 90% of the sun's rays pass through the transparent "skin" of the envelope, which is inflated by blowing it up like a balloon. The sponge, soaked with two quarts of sea water, absorbs the heat. The heat evaporates the water, which passes off as vapor, just like steam from a teakettle, leaving only the sea salt and other minerals in the sponge. This vapor condenses as fresh water on the inside of the skin of the envelope and then runs down into a reservoir at the bottom of the still. The still is tied outside the raft and floats on the water, requiring little or no attention. On a sunny day the still will make about one pint of fresh drinking water. Six stills are packed aboard each life raft.

The third source is a chemical sea water desalting kit that comes packed in a neat can. It is designed for use when the sky is overcast, when there is neither rain nor sun. Heart of the chemical kit is a compound consisting of about two-thirds silver put up in briquettes in a package weighing about 22 ounces. One of these briquettes is dropped into a plastic bag filled with sea water. Almost instantly the briquette disintegrates and by precipitation removes the harmful salt and other substances. This kit produces eight times the amount of water contained in one drinking-water can.

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AGRICULTURE

Cabbage and Turnip Crops Threatened by Widgeons

➤ GROWERS of cabbage and turnip seed in the Puget Sound region, where a large part of the American garden-seed production is now centered, have been having their troubles with widgeons. The U. S. Fish and Wildlife Service has had to come to their rescue and devise means for driving off the web-footed marauders.

Widgeons are a species of wild duck. Discriminating hunters don't care much for them, often scornfully referring to them as "trash ducks," because they aren't as good eating as nice, fat mallards or canvasbacks. Widgeons feed by choice on small seeds—and cabbage and turnip seed are small. This semi-immunity from shooting, coupled with their specialized appetite, has compounded trouble for the seed farmers, whose fields they raid at night.

The Fish and Wildlife Service has at least partially solved the problem by devising a kind of mechanized scarecrow—or perhaps more accurately, scareduck,

It consists of an ordinary automobile spotlight, mounted on a motor-driven turntable and set to revolve and flash at ten-second intervals. A storage battery supplies the power.

When the device is first turned on, a few shots are fired from a shotgun, which sends the widgeons on their way in a hurry. On subsequent nights, the birds don't even wait for the shots, but clear out as soon as the light begins to flash.

One of these revolving lamps is usually sufficient to scare the widgeons off a couple of hundred acres of cabbage field.

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ENTOMOLOGY

Total Insect War Urged

Program for extermination of pests instead of merely control is declared possible and practicable. Success against fruit fly cited.

► **TOTAL WAR** against man's insect enemies, with the avowed object of total extermination instead of mere "control," was offered as a possible and practicable program before the American Association of Economic Entomologists in New York, in the address of its retiring president, Prof. E. O. Essig of the University of California. Man has unintentionally wiped out a number of animal species, like the dodo and the passenger pigeon; there seems to be no good reason why he should not be able to repeat the performance intentionally with other species he finds obnoxious, if he will only plan carefully enough and follow through with sufficiently long and intensive campaigns of eradication.

Success in at least one such campaign was cited by Prof. Essig. About 20 years ago the Mediterranean fruit fly, a terrible menace to certain fruit and vegetable crops, especially the citrus fruits, was accidentally introduced into Florida. Drastic measures were necessary, but by thorough cooperation among federal, state and private interests the last traces of the fly infestation were wiped out in a short time.

Similar success appears to be in sight in campaigns now being waged against other insect pests. Among these, Prof. Essig mentioned the Mexican fruit fly, pink bollworm, and sweet-potato weevil in the South, and the pear psylla in the Pacific Northwest. Prospective victims suggested by the speaker for future anti-insect blitzes include Japanese beetle, gypsy moth, browntail moth, all kinds of malaria mosquitoes, bedbugs, lice, fleas and houseflies.

A powerful agent in these postwar wars to make crops less costly and personal life safer, more comfortable is the now widely known DDT. At the meeting, the first official pronouncement of organized entomological science on this insecticide was offered, in the form of a special committee report.

DDT has tremendous possibilities, the report emphasized; but there are also some difficulties attending its use that need further investigation without loss of time. For this reason, adequate funds

and personnel for research were pointed out as desirable, together with the assignment of sufficient quantities of DDT for experimental purposes.

DDT's promise spreads broadly over three fields: public health, household comfort, and agriculture. In the first category come the triumphs already scored by DDT against such plagues as malaria and typhus. Household comfort will be promoted by the abatement or even the complete wiping out of such insects as flies, fleas, bedbugs and "nuisance" mosquitoes. DDT can be useful to agriculture not only in combating field and orchard insects but also in protecting forests, livestock and poultry.

DDT is poisonous to man and the warm-blooded animals generally if swallowed in sufficient quantity, or absorbed through oil on the skin. However, as commonly used at present, there seems to be an adequate margin of safety. Cold-blooded animals like fish and frogs, and beneficial insects, are more sensitive; their protection was cited as one of the desirable objectives of research.

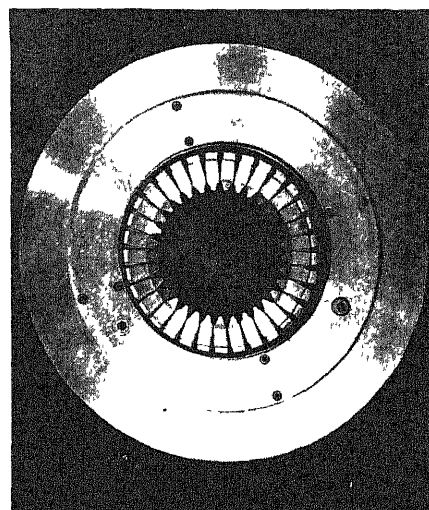
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ENGINEERING

Gear Cutting Machine Cuts All Teeth at Once

► **GEAR CUTTING**, an all-important job in the manufacturing of practically every machine, is revolutionized by a new machine developed by the Michigan Tool Company that cuts all gear teeth on a gear wheel at the same time with radially fed form-tool blades having a shear-cutting action. It is a rapid machine capable of rough and semi-finish cutting 60 to 100 gears an hour, depending upon the job.

The machine contains a circular cutter head consisting of a ring with the form-tool blades arranged on the inner circumference. When the gear wheel is placed on the work holder in the machine it is automatically clamped, and the cutter head is automatically lowered into cutting position. The work moves up and down. At the beginning of each up stroke, all blades in the cutting head



SPEEDS GEAR CUTTING—Cutting all the teeth of a gear at one time cuts down greatly the time required for making these important machine parts. The cutter head shown here does the job. It is part of a new machine designed by Michigan Tool Company engineers.

are advanced slightly an equal amount. On the return stroke the blades are retracted enough to provide for clearance for the tools.

The machine is adjustable and largely automatic when set. The amount that the blades are fed into the work on each stroke is adjustable, and the correct sizing of the work is also automatically controlled and adjusted. Adjustments are likewise provided for speed of vertical reciprocation and length of stroke.

To sharpen blades, or to change over to another type of gear to be cut, the entire inner cutter-head assembly is removed as a unit, and another head inserted. Only a simple grinding operation is required to bring dull blades back to correct form.

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Chemical May Preserve Flavor of Processed Foods

► A **CHEMICAL** relative of vitamin C may be useful in preserving the vitamin C content, the color and the flavor of processed fruit juices and other foods, W. B. Esselen, Jr., J. J. Powers and R. Woodward, of Massachusetts State College, announced.

The substance, called de-iso ascorbic acid, is a harmless compound, they reported.

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CHEMISTRY

Plastics Research Spurred

For the pending demands of the postwar era, new plastic materials are being perfected for new uses, and machinery used in production of plastics is being redesigned.

► PROOF THAT research in plastics is being spurred to meet the pending postwar demands for many plastic items was given at the first general session of a meeting of the Society of the Plastics Industry, held in New York, when 25 experts, representing various industrial companies engaged in plastics work, presented reports of accomplishments and suggestions for further scientific study in the field.

New plastic materials are being perfected for new uses, and machinery used in the production of plastics is being redesigned for larger volume production. There was also evidence that many firms with little or no previous experience in designing plastics and producing articles made from plastics will enter the field after the war.

The need for standardization of words and language, weights and measures for the purpose of communicating ideas and carrying on trade in the plastics field was voiced at the meeting by W. A. Evans, of the Bell Telephone Laboratories, New York.

When the unit of measure has been developed, Mr. Evans recommended that measuring devices be provided. He also called attention to the need for being able to buy plastics by specification, with an established set of identifying characteristics for each type of plastic.

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Plastics Heated by Radio

► IN EXTRUDING plastics for the manufacture of such products as plastic thread for use in the production of plastic cloth, and thicker filaments for plastic screens used by the armed forces in tropical countries, the main problem is to soften, and if possible melt the plastic, Paul Quinn, consulting engineer, told the meeting.

The use of high-frequency radio waves makes it possible to heat a mass of plastic from the center outward and transform it into a uniform molten mass, after which it can be extruded through a die at low pressure, and surface-hardened by current methods. This method eliminates the high pressures and mechanical

strain of the old type of extruder, Mr. Quinn stated.

Up to the present time, the heating of plastics before extrusion has been attempted by conduction of heat, he commented. Water or oil were first heated to a known temperature, then the heat was transferred from the liquid to metal by conduction and finally from the metal to the plastic, also by conduction.

One possibility opened up by the use of low-pressure extrusion made possible by high-frequency radio wave heat was cited by Mr. Quinn. It is the coating, with plastics, of low-strength yarns and cords, also tinsel wire which is a combination of very delicate copper ribbons interwound with cotton thread and twisted together, forming a rough, easily distorted cord of little strength. Plastic coating would give the yarns, cords, and tinsel wire added strength desirable for industrial or commercial use.

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Printing on Plastics

► JOINT effort between the printing ink industry and the plastics industry was called for by J. J. Micik of the International Printing Ink Division of the Interchemical Corporation, Brooklyn, N.Y. Plastics such as cellophane, nitro-cellulose and cellulose acetate are being printed by rotogravure, letterpress, silk screen and other methods. Each of these processes uses a different type of printing ink. The problems presented by coating applications can be effectively solved by combined research and cooperation of both industries, he stated.

It is necessary to know the type of plastic being used, Mr. Micik pointed out, because a thermo-plastic could not be speedily dried after printing by means of high-temperature baking, since it would become soft or possibly melt.

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More Synthetic Resins

► UNLIMITED postwar civilian applications for synthetic resins made with resorcinol that possess high strength and great durability were predicted by Philip

H. Rhodes, chief of research and production of the Pennsylvania Coal Products Company, at the meeting. Among the present uses mentioned were those in the fields of marine, aircraft and building construction, furniture, castings, coatings, and grinding wheels.

Chemists find many applications for resorcinol known chemically as "meta hydroxy phenol." It is used as a reagent in the manufacture of medicines and organic chemicals, in tanning, and in making unbreakable phonograph records; a substitute for camphor in making celluloid; a sensitizer for silver bromide-gelatin photographic papers; and an ingredient in tooth powders, hair lotions and skin creams. In the production of synthetic resins for plastics, resorcinol reacts with formaldehyde to give resins that correspond in many ways to phenol-formaldehyde resins.

Until a short time ago resin formation with resorcinol was practically impossible to control, Mr. Rhodes reported. The reaction that took place when the resorcinol and formaldehyde were processed together proceeded almost explosively, so that a fully cured resin was produced before chemists could stop the progress of the reaction and permit castings to be made or adhesives produced.

Through special techniques developed during an investigation carried on by the Pennsylvania Coal Products Company over several years, many desirable properties of resorcinol resins were created, Mr. Rhodes stated. While these techniques are covered by secrecy orders from the Patent Office, and therefore may not be disclosed at present, the properties are familiar to many users in such applications as paper- and fabric-laminated plastics that have greater strength than similar materials made with phenol-formaldehyde resins; and in the manufacture of grinding wheels, where the length of wear and efficiency is twice that given by phenol-formaldehyde resins.

Increased temperature greatly accelerates the cure of these resins, although they were originally developed for room-temperature bonding. The use of higher than room temperatures is prevalent in the manufacture of heavy laminated timbers such as have been employed in the small-boat program of the Navy Department. Temperatures as low as 140 degrees Fahrenheit are sufficient with these resins for the production of laminated white oak timbers for ship use as keels, ribs, skegs and other parts that undergo severe stresses in actual use, Mr. Rhodes declared. He also pointed out that wide-

spread use of these resins is being made in the manufacture of plywood tubing.

Resorcinol resins, Mr. Rhodes declared, have also been used as bonding agents in the assembly gluing of laminated (sandwiched) and molded phenolic plastics,

nylon, natural and synthetic rubbers, and other materials. By treating metal surfaces with baked priming coatings of certain thermosetting resins, he stated, excellent bonds are obtained with resorcinol resins used as bonding agents.

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MEDICINE

Vitamin Used for Typhus

Large doses of para-aminobenzoic acid are found effective against louse-carried disease when given during first week of illness.

► **LARGE DOSES** of para-aminobenzoic acid, one of the vitamins of the B complex, have been found effective against louse-carried typhus when the treatment is begun during the first week of illness, report Lieut. Comdr. Andrew Yeomans (MC), U. S. N. R., and Lieut. Col. J. C. Snyder, Maj. E. S. Murray, Capt. C. J. D. Zarafonetis and Maj. R. S. Ecke of the Medical Corps, A. U. S. (*Journal, American Medical Association*). The course of the disease was made less severe and the average duration of the fever considerably shortened.

Twenty cases of louse-borne typhus were treated with the para-aminobenzoic acid, a constituent of liver and yeast, at the United States of America Typhus Commission Ward at the Fever Hospital, Cairo, Egypt. The course of the disease was compared with that of 44 other patients who did not receive the treatment.

It was found that large amounts of the para-aminobenzoic acid could be administered with ease to patients suffering from typhus. Except for a tendency to develop a white blood cell count, no unfavorable effects were observed when the acid was properly administered.

Patients given the treatment were selected by chance, every other one being selected as they entered the hospital. Males between 18 and 48 years of age who were unvaccinated for typhus, who had no obvious complicating conditions at the time of admission and who had had the disease not longer than a week were selected for the treatment or to act as the control group.

In all cases the para-aminobenzoic acid was given by mouth. Patients took the powdered form readily if it was suspended in water or partially dissolved in a sufficient volume of five per cent

sodium bicarbonate solution to render the mixture slightly alkaline.

The initial dose varied from four to eight grams. In the majority of cases the initial dose was followed by two grams every two hours unless the concentration in the blood attained excessive values. After experimentation it was decided to continue the treatment until the patient's rectal temperature was 99.5 degrees Fahrenheit or less for 24 hours.

After it was found that nausea and vomiting occurred after taking the acid, sufficient sodium bicarbonate was given to neutralize the para-aminobenzoic acid. Fifteen patients who received the treatment had a definite rash, which was not as extensive, however, as that seen in the majority of patients not receiving the acid treatment.

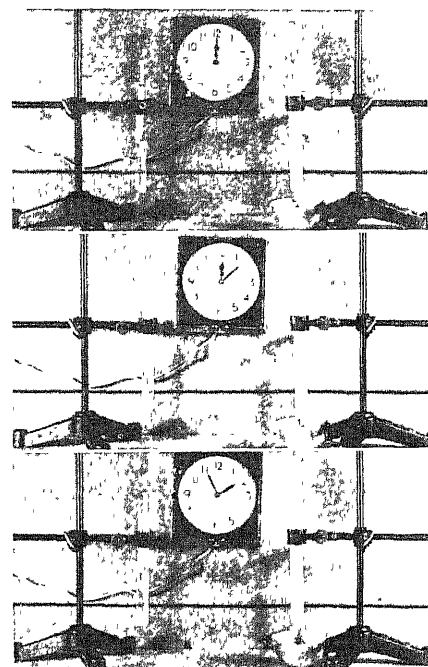
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CHEMISTRY

New Glass Able to Resist Hydrofluoric Acid

► **A NEW GLASS** for laboratory utensils, acid containers, safety goggles and other purposes in which protection against the action of hydrofluoric acid is essential has been developed in the laboratories of the American Optical Company. It is the first known glass to offer major, desirable resistance to the attack of this powerfully corrosive acid, which disintegrates ordinary glass, destroys most metals, and produces dangerous burns on human flesh.

The discovery of the new glass is expected to simplify the handling of this industrially important acid, which is used extensively in scientific laboratories, and in such industrial operations as the pickling of metals, etching of glass, processing of textiles, manufacture of fluor-



RESISTS ACID—The test tube at the left is made of the new glass, while the one at the right is of ordinary glass. At 12:00 o'clock (top picture), hydrofluoric acid was poured into both tubes. Instantaneously the acid attacked the tube made of ordinary glass. In a few minutes (middle picture), the ordinary tube is corroded, while the tube at left is still transparent. In less than two hours (bottom picture), the acid has eaten through the tube of ordinary glass and has spurted through the hole into the platinum dish and onto the floor.

ides and ceramics, and as a catalyst in oil refining and synthetic rubber manufacture.

The new glass contains no sand, the basis of all commercial glasses. Its major ingredient is phosphorus pentoxide, which by itself reacts with water instantly and with almost explosive violence. The profound chemical changes that take place in making the new glass result in a product less soluble in water than ordinary glass. It is transparent and has melting and working properties about the same as ordinary glass, can be cast or drawn into sheets or blown into bottles or other shapes. It can also be ground and polished, tempered and subjected to other processes involved in glass technology without special equipment or technique.

Science News Letter, January 6, 1945

GENERAL SCIENCE

U. S. Scientists Send Journals to Latin America

➤ SCIENTISTS in the United States are collaborating with their Latin-American colleagues in making available files of journals for new and active institutions where the lack of adequate library facilities has greatly impeded research.

Already the libraries of two such institutions have been implemented by the addition of journals. The Committee on Inter-American Scientific Publication, headed by Dr. Harlow Shapley, director of Harvard Observatory, is now collecting journals for a number of other Latin-American institutions.

Scientists who have unused files of journals which they are willing to contribute are invited to communicate with the Comité Interamericano de Publicación Científica, Harvard College Observatory, Cambridge 38, Mass.

Science News Letter, January 6, 1945

TECHNOLOGY

Shoe Uppers May Soon Be Given Oil Treatment

➤ SHOE UPPERS may soon be given oil treatment similar to that now increasingly used for shoe soles and wear longer as a result. Laboratory research work is now under way to determine the best processes of treating upper leather, and whether or not the treatment is economically desirable.

Oil treatment of soles increases their wearability by 25% on an average, according to the director of the laboratory of the Tanners' Council of America at the University of Cincinnati, where extensive investigations have been made. The National Bureau of Standards conducted extensive research on the improved wearing qualities of treated sole leathers during 1943 and found their life increased from 14% to 40%, depending upon the preparation used. The higher percentages were for wax-impregnated soles.

All leather soles on Army shoes are now treated with a formula developed at the Cincinnati laboratory of the Tanners' Council, and a similar formula, with slight changes made by the War Production Board, is now used on millions of civilian shoes under a voluntary program fostered by the board. Civilians in the future will need fewer shoes a year.

If uppers have an equally increased life with oil treatment, the annual shoe

bill of America will be still further decreased, and greater quantities of leather will be conserved for other uses. Approximately 250,000,000 pairs of shoes with leather soles were produced in the United States in 1943; a reduction of 25% in this quantity represents a lot of leather as well as millions of dollars in savings.

Science News Letter, January 6, 1945

Pet Deer Gives Birth To Triplet Fawns

See Front Cover

➤ THE FAWN TRIPLETS shown with their mother on the front cover of this SCIENCE NEWS LETTER were born about the middle of last August. Frank W. Baldwin, who has a deer farm in Pittsburg, N. H., states that Jill, the mother, had previously given birth to two sets of twins.

Twins are more frequently born to deer than to other related hoofed animals, the chances being about even that a doe will give birth to twins instead of to just one fawn. It is, however, quite unusual for a doe to have triplets, and few are on record as having been born in captivity.

Science News Letter, January 6, 1945

PHYSICS

Degree of Heat Controlled In Cordless Electric Iron

➤ CORDLESS electric flatirons, soon to be in production, draw heating electric current from the house circuit only when the iron is resting on an automatic safety base placed nearby. Two prongs extending from the back of the iron then make electric contact which permits the current to flow through heating elements in the iron. The current ceases to flow when the iron is removed.

The safety base, connected to an electric outlet, contains a thermostat and an adjustable regulator which control the flow of electricity to the iron, and the temperature desired. This prevents overheating, and also eliminates all danger of fire as no current flows after the iron has reached the temperature for which the regulator is set.

This new safety household ironing device was developed in the laboratory of the Eureka Vacuum Cleaner Company, and the company has had authorization from the War Production Board to manufacture a limited number.

Science News Letter, January 6, 1945



INVENTION

No Fog Collects Inside Lenses of New Goggles

➤ NO FOG collects inside the lenses of new goggles announced recently, regardless of how freely the wearer perspires, because of the sweeping action of fresh air drawn through them over the eyes and into the lungs by the ordinary lung action in normal breathing. They were developed by Polaroid Corporation engineers and have been tested in desert areas and in dust-laden factories.

The plastic goggle lens has a bulbous nosepiece and air intake ports in the frame to the right and left of the eyes. These ports are fitted with filter felts to diffuse the air and to catch any dirt or dust in it. The bulbous nosepiece has an inlet valve through which the air can pass to the nostrils and lungs, and an outlet valve at its extremity for the expulsion of gases from the lungs.

Ordinary breathing draws fresh air through the intake ports and filters where it spreads over the eyes and takes up the moisture from perspiration, then through the inlet valve to the nostrils. Exhaling closes the inlet valve and opens the outlet valve so that the exhaled breath is discharged directly into the open.

Science News Letter, January 6, 1945

Plastic Soil Conditioner Tested in Michigan

➤ A GOOD moisture-conserving soil conditioner, a kind of artificial humus, was reported by Mrs. I. M. Felber of the Michigan Agricultural Experiment Station. The material is methylcellulose, which is classifiable as a cellulose plastic. Worked into the soil, it absorbs and holds moisture, making it available for plants when the unmodified soil would no longer be able to sustain them.

Other possible uses for methylcellulose include tree wound dressings; protective coating for seeds and fruits against insects, fungi and bacteria; protection for plants and cut flowers in shipment; preventive for root drying during transplanting; and laboratory culture medium for bacteria.

Science News Letter, January 6, 1945



PHYSICS

39-Year-Old Physicist Heads GE Research

➤ A PHYSICIST who is not yet 40 years of age took over the direction of the General Electric Company's research laboratory at the end of the year. He is Dr. C. G. Suits who has been elected a GE vice president.

He succeeds Dr. W. D. Coolidge, inventor of the Coolidge X-ray tube and GE research director since 1932, who retired as vice president and research director.

Dr. Chauncey Guy Suits was born in 1905, the same year that Dr. Coolidge joined the then embryonic GE research laboratory.

War radio research in the Office of Scientific Research and Development has occupied the major part of Dr. Suits' time during the past few years. Dr. Suits has been assistant to Dr. Coolidge since 1940.

Science News Letter, January 6, 1945

CHEMISTRY

Lighter Weight Blankets From Silicon Compound

➤ POSTWAR BLANKETS and sleeping bags may weigh but a few ounces, yet afford greater warmth than a mink coat or red flannels, as the result of a new development in the textile industry, an insulating material that weighs as little as three pounds per cubic foot and in point of low heat transfer is about twice as efficient as cork.

Known commercially as Santocel, it is an organic silicon compound perfected by research chemists of General Electric Company, Schenectady, N. Y., and the Monsanto Chemical Company. A derivative of silica, or sand, the compound is one of the most versatile chemical skeletons known to man. It looks like finely ground snow, and pours like water. In a cupful of the material there are literally millions of dead air pockets, which act to slow up the transmission of heat or cold. It is also employed as insulating agent between quilted layers of fabric designed for use in hunters' coats, life jackets and life rafts.

Postwar refrigerators may be thin-walled if they make use of the new prod-

uct, occupying no more kitchen space than present models but giving 40% more cubic content.

Used in camouflage coatings, the silica compound breaks up surface light rays, affording a desirable dull sheen. It is also used in rubber to add strength without carbon black's discoloring effects.

Research is being conducted to determine new uses for the material. Recently they found that it could be poured between the layers of uncut velvet, sealed in with thermoplastic stitching in millions of little pockets, and the cloth used for lightweight dressmaker coats for women.

Science News Letter, January 6, 1945

ENGINEERING

Connector Block Simplifies Wiring for Aircraft

➤ BUILDERS of modern aircraft, like the giant B-29 Superfortress which has over ten miles of electrical wiring, may benefit from a new connector block system of electrical connecting that eliminates many of the plugs and sockets, yet permits additional electrical systems to be added with ease.

Developed by the Technical Board of the Society of British Aircraft Constructors, the new system employs a series of connector blocks with leads directly to the main power source, a generator or batteries. Simplified plug-in leads extend from the connector blocks. The blocks, made from lightweight plastic, are available in two-, three-, five- and 15-way units, either in single or double tiers. Should it become necessary to increase the number of leads, another connector block of larger capacity is added.

Compact in size, the new connector blocks are not much larger than an ordinary match box. The five-way unit measures 2½ inches wide, 1¼ inches high and 1¾ inches deep.

The new system is standard for all new types of British aircraft. In operation, if a part of a plane, such as a wing, has to be detached and replaced or repaired, all the electrician has to do is unplug the leads from the connector block, and plug them in again when the wing is re-installed. The operation is as simple as plugging an electric toaster into a wall receptacle.

A spray-proof cover and a "honeycomb" wiring pattern check moisture condensation, which accumulates as the aircraft gains altitude and passes from warm to cold atmospheres.

Science News Letter, January 6, 1945

INVENTION

Milkweed Gin Separates The Floss from the Seed

➤ A MILKWEED gin, that separates milkweed floss from its seed as cotton lint and seed are separated in a cotton gin, is the invention on which patent 2,362,965 has been awarded to Dr. Boris Berkman, Chicago physician who demonstrated that milkweed floss can be a satisfactory replacement for war-scarce kapok in life-saving apparatus

Essential part of the apparatus is a wide, flat, flexible-walled tube through which the floss is carried by a gentle air blast. During its passage, it is constantly agitated by a series of mechanically driven rollers, which shake the seed loose. At the end of the run, the freed floss is carried upward by the air current, while the heavier seed fall into a hopper, to be carried off for oil extraction and other by-product uses.

Science News Letter, January 6, 1945

ORNITHOLOGY

Christmas Census Checked Number of Birds in Country

➤ THE FIRST Christmas began with the taking of a census in Judea—read the Gospel according to St. Luke, beginning with the second chapter. And in this country a census marks Christmas still; only it is a census of winter birds instead of people.

On Christmas Day, and a few days before and after, thousands of persons interested in birds ranged woods and brushlands and open places, noting down the names of all birds they saw and checking the numbers. Takers of this avian census range in age from Boy and Girl Scouts to their grandparents, in scientific learning from university ornithologists to enthusiastic amateurs.

The Christmas bird census does not pretend to count every bird in the country. It undertakes merely to make a careful listing of all the birds in numerous good sample habitats, many of which are revisited and rechecked year after year. A good idea of the fluctuations in the bird population of a given area can thus be obtained.

The Christmas bird census, which has been going on annually for some 30 years, is sponsored by the National Audubon Society. Results are collated and published in a special supplement of the Society's official journal.

Science News Letter, January 6, 1945

GENERAL SCIENCE

Science Previews

We can look forward in 1945 to a redirection of scientists and laboratories toward goals of peaceful living. Don't expect big advances.

By WATSON DAVIS

► THE YEAR 1945 may be known to future historians as the year of the introduction of atomic power or the year that the World Research Administration was founded.

Or our grandchildren may rejoice in the discovery of the cause and cure of cancer in 1945. Or the synthesis of a chemical that banished tuberculosis as a major plague.

These hopes for 1945 are more likely to be wishful thinking—like most New Year's resolutions.

We can look forward in 1945 to a redirection of science and technology toward peaceful living and reconversion. Our physicists, chemists, biologists and medical researchers are tapering off their essential and fruitful service of science to the war.

It takes many months for ideas and demonstrations of new scientific weapons to be translated into practical implements for fighting. For that reason the new methods and weapons that may be introduced by our Army and Navy, if they are to appear before the major phases of the war are over, must be well out of the laboratory by now.

Reconversion Takes Longer

Reconversion of our scientific laboratories and our scientists can and must proceed faster and earlier than even the reconversion of our manufacturing plants and factories. In the long run there is more at stake. If we are to make the world a better place in which to live, and if we are to assure the research advances for the future from which the fabric of our future civilization is woven, we must get the scientists and the engineers busy promptly upon non-war researches on wide fronts.

We must see to it that the young men of scientific talent who have been fighting our wars are able to return to college and technical school to prepare to man the research laboratories of future years.

When D-Day of Europe was being prepared, more than 100,000 boys being sent to college by the Army were rushed

into the infantry services as an emergency measure. As soon as the emergency is over with the fall of the German war machine, these boys and others who show similar ability should be assigned back to our technical schools, medical colleges and universities as an urgent national policy. The continuance of their training is not to benefit them or give them any privileges, but to enable them to serve their nation in peace to their best ability.

Wounded men and others who are discharged from the armed services should be given educational opportunities according to their abilities, but the searching out of the youth who have research abilities is a different and nationally more urgent task. It should proceed while the Pacific war continues.

Our universities and technical schools have already come painfully close to disorganization due to the impressing of

their faculties and their students into the war, either as researchers or fighters. During 1945 this will need careful financial and educational attention from the government.

In the meantime, the research laboratories of our great and small industries will expect during 1945 to have a chance to resume the experimental pioneering that will bring forth new and better products when the production of civilian consumption goods can be resumed in full measure.

Penicillin and DDT

Among the war developments in science that are likely to be made available to the public in larger degree during 1945 are penicillin which can be expected to be proved effective in treating even more diseases; and DDT, the chemical that has proved so effective in controlling disease-carrying insects and insects that cause crop and household damage.

Measles will be attacked on a large scale as a public danger by the distribution through health departments of gamma globulin, a fraction of human



DEVASTATION—Brought by war is typified in the U. S. Navy picture of a battered Cherbourg railway station.

SCIENCE INFORMATION

for Members of the
Armed Forces OVERSEAS

IN order to serve the armed forces, Science News Letter recently offered its new monthly Overseas Edition to men and women outside the United States.

This special edition is geared to the armed forces—it contains scientific information interesting and useful to them. News important to us here, but not to them there, is cut out in order to pack the Overseas Science News Letter with the science information of greatest interest and use to members of our armed forces Overseas.

It is just sixteen pages (like the Science News Letter you are reading), but it is pocket size, printed on Air Mail weight paper, and the pictures and types are one-third smaller than the regular weekly edition. It is mailed by **FIRST CLASS MAIL** to service people Overseas each month, for \$1.25 per year.

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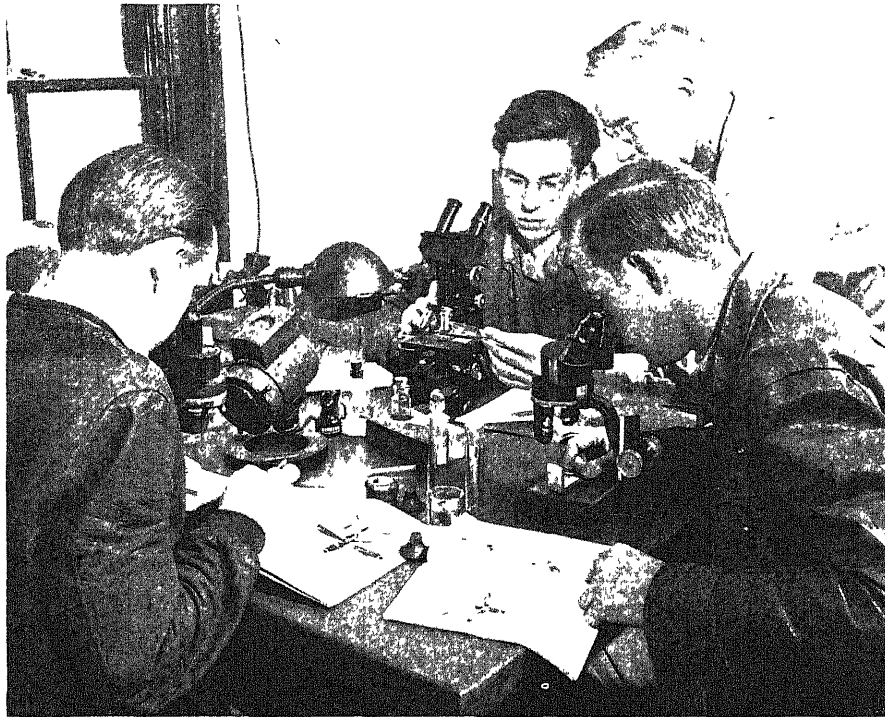
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O-833



RESTORATION—When peace returns, man must rebuild and resume his eternal battle against disease-carrying insects and other destructive agencies. The picture shows U. S. Public Health Service scientists at work.

blood donated for the war. This substance can be used to immunize against measles and thus control it effectively.

Previous wars have almost always been accompanied by epidemics and plagues of world-wide scale, but this war, thanks to the advances of medicine and the application of health measures, has brought forth so far no such menace. Health authorities hope that this will continue to be the case, and they confidently expect the health of the United States in 1945 to continue at a favorable low level of disease and death.

Mental Health Value

With the example of the mentally wounded of the war before them, the public may realize that one of the great problems of the world is human behavior or mental health. Psychiatrists and psychologists know much more about the ills of the mind and how to prevent them than is being applied. The gradual application of some of this knowledge may receive renewed impetus during 1945.

The organization and administration of medical care in all its aspects continues to be a major American problem, the subject of much emotion and propaganda. Through the extension of the

social security methods, some approach to the solution of this problem may be made under congressional mandate.

Congress may also decide that the efficient and well-implemented, although little publicized, organization of scientific research for war should be continued in some of its aspects into the reconversion period. The fundamental principle of conducting necessary research in the public interest in educational and industrial research laboratories would probably be continued either during a transition period or perhaps upon a continuing basis.

Those who look into the future of science see rocket planes streaking through the stratosphere faster than sound's speed, houses stamped out of airplane factories like so many doughnuts, food that lasts forever and tastes like the nectar and ambrosia of the gods, new chemicals that will banish old age, and other near miracles of science and technology.

In the continuing war year of 1945 these things can hardly be expected to be accomplished. Many of them may never come true, but that will not stop the scientists and engineers who are released from plotting death from trying their utmost to bring such accomplishments to the earth of everyday living.

Science News Letter, January 6, 1945

Do You Know?

PUBLIC HEALTH

Maximum Manpower

Canada has 84 *sanctuaries* for birds, including wild ducks, geese, and other migratory water fowl which visit the United States annually.

Two *diesel locomotives* are now in use on the government railroad in Alaska between Anchorage and the new deep-water port at Whittier; because of tunnels on the line coal-burning engines are not desirable.

Many species of *bamboo* from the Far East have been brought to America and are growing successfully in Georgia, Florida, Louisiana and Puerto Rico.

The pilchard, or *California sardine*, leads the United States fisheries, accounting for approximately 25% in weight of all United States and Alaska fish landings.

Crossline pigs, obtained by crossing inbred pure lines, give promise of being highly efficient pork producers with a lower death rate while young and a heavier weight throughout their life.

Sturup pumps designed for fire-fighting by the Office of Civilian Defense are now being used for *insect-fighting*.

Rutin, a little known glucose drug obtained from certain types of tobacco, is used in the treatment of a tendency to hemorrhage; a new and improved process for its extraction has been developed.

Four insect *pests* likely to attack potatoes are potato leaf hoppers, Colorado beetles, fleabeetles, and aphids; copper-compound sprays repel the leaf-hoppers, arsenate of lead or calcium kills the beetles, and nicotine the aphids.

Cantaloups and cucumbers can be planted side by side as they are not closely enough related to cross, but cantaloups will cross with melons and pumpkins although the effect does not show that same year.

The principal *forestry* wealth of Guatemala consists of construction and cabinet woods such as mahogany, cedar, pine, balsam, quaiacan and palo blanco.

Health and physical fitness efforts should start much earlier than proposed year of military training if greatest number are to be fit.

➤ THE PROPOSED year of military training for youths of 17 or 18 would give the nation many more young men fit to fight on any future M-Day than we had at the time of the Pearl Harbor attack. For getting the maximum manpower in fighting trim, however, health and physical fitness efforts should start much earlier.

British experience early in the war showed that men unfit for fighting, even though they had no serious defects or disease, could be strengthened and hardened in much less than a year's time by suitable feeding and physical exercise.

A year of military training would have the further advantage of getting our young men used to Army life and discipline. This would be easier at 17 or 18 than at 25 or 30 years. Certain physical defects, such as hernias and bad teeth, could be corrected. Syphilis and gonorrhea could be cured. At the end of the year, the young men would undoubtedly be stronger and healthier, and the nation would have more potential fighting power.

A great many young men, however, would still be lost to the Army because of disease or defects that could not be corrected at the age of 17 or 18, though they might have been prevented by proper attention at earlier ages.

Of 4,217,000 men between 18 and 35 rejected up to June of 1944, 273,300 were for heart and blood vessel diseases. A very large percentage of the heart disease among young adults starts with rheumatic fever in early childhood. By the age of 17 or 18 the heart damage has already been done. While rheumatic fever is not yet preventable, there is good evidence that it may soon be through suitable sulfa drug treatment of streptococcus infections.

Of the 212,700 rejections for eye defects, probably very many could have been avoided by better care of the eyes and of eye infections and by greater attention to prevention of accidents in childhood.

The same is probably true of the 162,900 rejections for ear defects, which range from a punctured ear drum to total deafness. Punctured ear drums and a

good deal of hearing loss occurring among young adults results from infections such as colds and various childhood diseases. Better treatment of these ailments, including prompt attention to ear infection if it occurs, would salvage many thousands of young men for military duty, to say nothing of what it would mean for their own health and peacetime efficiency.

Rejections for bad teeth were very low, only 36,100. This was because the armed forces kept lowering their dental standards to procure manpower. It meant that about one-third of the nation's dentists had to be called into the services to do the tremendous job of repairing and restoring decayed or missing teeth in the men accepted for service.

The biggest single medical cause of rejection, as is well known, was for mental disease. The origin of this kind of trouble can often be traced to conditions affecting a person when he was a small child. Family life and early training play a highly important part in making or marring mental health.

What could be accomplished by a year of military training at the age of 17 or 18 is a debatable question. Psychiatrists have said, over and over, that putting a man into the Army is not the way to cure mental sickness, even in its milder forms. For the average youth of 17 or 18, a year of military training might not cause any difficulty and might be good from the mental health standpoint.

There should be very careful psychiatric selection, however, because this age is a time of life when military training might do some damage to a youth with a personality weakness. If a trend toward psychoneurotic illness was already present, it might be made stronger and a breakdown rather than the desired strengthening of health might result.

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Only about 60% as many *sealskins* were harvested last summer on the Pribilof Islands, the center of the seal-fishing industry, as were taken in 1943 when an unusually large number were obtained to make up for the 1942 shortage.

MEDICINE

Toxic Effects Treated

One of the B vitamins has been used to counteract the ill effects of three different drugs. Previous methods had been disappointing.

➤ PYRIDOXINE, or vitamin B₆, has been used successfully to treat three patients suffering from the toxic effects of each of three drugs, Dr. Max M. Cantor and Dr. John W. Scott, of the University of Alberta, report. (*Science*, Dec. 15)

The drugs were sulfathiazole, aspirin and thiouracil. The latter is a new remedy for the kind of goiter that comes from an overactive thyroid gland.

Agranulocytic angina is the name for the condition which the three patients acquired as a result of these drugs. This disease is characterized by acute illness with fever, necrotic and ulcerative sores in the mouth and pharynx, and an extreme reduction of the number of granulocyte cells in the blood. It occasionally occurs without any apparent cause but more often follows the use of certain drugs such as amidopyrine, some bar-

biturates and dinitrophenol. Since the sulfa drugs have been used to treat bacterial infections, agranulocytic angina has been seen more frequently, the Canadian scientists point out.

Previous methods of treating the condition have often been disappointing.

The temperature in each of their cases fell to normal and symptoms disappeared within 48 hours after daily doses of pyridoxine had been given by hypodermic injection into a vein.

Since this vitamin was effective in overcoming illness due to three different drugs, the Canadian doctors suggest that it acts by stimulating the myelocytic elements of the bone marrow.

Their results suggest that the vitamin may widen the use of a large group of valuable drugs.

Science News Letter, January 6, 1945

out the other side of the house. The saw had broken loose from a nearby saw mill.

In his haste to dress for a game, a young football aspirant of Chicago put his jersey on backwards. Tugging fiercely to get it off, he broke his neck. And a housewife of Indianapolis dislocated a vertebra in her neck while vigorously brushing her teeth. Both recovered.

Science News Letter, January 6, 1945

CHEMISTRY

Continuous-Process Method For Turpentine and Rosin

➤ A CHEMICAL invention of value in both war and peace is a continuous-process method for the production of turpentine and rosin from the crude gum as it comes from the trees. This process was developed by a chemical engineer of the U. S. Department of Agriculture, Jesse O. Reed, rights in his patent, No. 2,363,692, are assigned royalty-free to the government.

The process flows through a succession of distilling columns, with steam temperatures maintained at the lowest point at which the work can be done. By doing this, the inventor explains, not only as a greater over-all economy achieved, but the quality of the rosin obtained is made considerably higher than that resulting in the old-fashioned batch processes, where higher temperatures have to be used.

Science News Letter, January 6, 1945

SAFETY

Odd Accidents

Freak mishaps right at home turn up in annual summary by National Safety Council of how people can get hurt without going to war.

➤ A PRIVATE, demonstrating to his wife how a booby trap works, was shot in the leg by the device he had hooked up from a shell, board, nail and piece of wire. This injury to a soldier home on furlough is among those which the National Safety Council lists in its 1944 round-up of odd accidents.

Another soldier, sent home to recuperate from wounds received in the South Pacific, found that life can be just as dangerous at home as in the thick of battle. As he watched a power lawnmower at work in his front yard, the thing picked up an old spoon left on the grass and hurled it with such force and accuracy that it penetrated the calf of his leg and had to be removed by an operation.

A two-year-old of Groton, Conn., had her sleep disturbed by a Navy plane which plowed through her bedroom and

whisked the blanket off her bed without touching her. The plane, zooming through the other wall of the house, crashed into a schoolhouse. The blanket, undamaged, was found in the wreckage.

Returning from a hunting trip, a family man in St. Louis placed his rifle on a high kitchen shelf where the children couldn't reach it. His wife, before leaving home to visit a neighbor, took all the arrows away from her young son, leaving him with only the bow. But the ingenious son substituted a yardstick for an arrow and let it fly from the back porch toward the kitchen. Going through a hole in the screen door, the yardstick struck the trigger of the rifle. The rifle went off and the bullet struck his little sister.

A Floridian was eating breakfast one morning when a buzz saw ripped through the kitchen wall, sliced the breakfast table neatly in half and whirled



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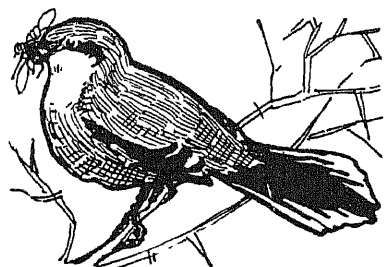
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Winged Wildlife

➤ WINGED WILDLIFE, to almost anyone, probably connotes only birds—game birds first of all, with songbirds coming in almost as an afterthought.

But there is other winged wildlife in the woods and over the waters, not to be neglected in any attempt to get a significant picture of the biotic complex of any given area. Insects form the major part of the food of many species of birds and fish, reptiles and amphibians. They are carriers of pollen necessary for the development of seeds and fruits that serve as food for others. Some of them are enemies of larger wildlife; some befriend us and the other warm-blooded animals by preying on these enemies.

Need for better understanding of this complex and as yet but little understood part of the life of our forests and fields was called to the attention of the American Association of Economic Entomologists by a special committee under the chairmanship of Dr. H. H. Stage of the U. S. Bureau of Entomology and Plant Quarantine. Citing the great success of the U. S. Fish and Wildlife Service in preserving and increasing the larger species of direct interest to sportsmen, conservationists and nature lovers, the committee stressed the importance of first learning more about the insect element in the web of wildlife and then applying that knowledge for the encouragement of "good" insects and the restraint of "bad" ones.

Something has already been learned, the committee pointed out, of the importance of managing insect life in the task of managing fish. Some waterside areas where fish never swim or go to lay their eggs are nevertheless very important to the fish, because the insects that they eat breed there. It has also been discov-

ered that the practice of neatly clearing the brush away from shorelines may be a very bad thing for the fish, because insects first roost on these shrubs and straggling trees, then drop into the water where trout or bass may snap them up. The cycle is short but conclusive: no bushes, no bugs; no bugs, no bass.

Entomologists who are concerned with the encouragement of useful insects are looking at the prospects for wholesale insecticidal campaigns based on DDT with a certain degree of apprehension. DDT is no respecter of insects; it kills "good" and "bad" ones without discrimination. So if it is found necessary to use DDT to rid a forest area of, say, a gipsy-moth infestation, we must be prepared to face the prospect of its killing also the dozens of other insect species that provide food for the songbirds and for the fish in the trout streams.

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CHEMISTRY

Synergy in Chemistry Increases Effectiveness

➤ "TWO PLUS two makes five," or "The whole is greater than the sum of its parts," expresses the basic idea of the term synergy as used in chemistry, stated Dr. Pat Macaluso of Foster D. Snell, Inc., at the meeting of the American Chemical Society in New York. As an example he referred to pyrethrum, a common active agent poisonous to flies, whose effectiveness is tripled when mixed in the spray with a small amount of sesame oil, which in itself is harmless to household flies.

Dr. Macaluso presented a generalization of the nature of synergy and the factors underlying it, which, he said, have now been made for the first time in the field of industrial chemistry, but do not represent any new discovery of principle.

Synergy in chemistry is the cooperative action of two distinct substances "such that the total effect is greater than the

sum of the two effects taken separately," he explained. "It is a commonplace of chemistry," he continued, "that a greenish yellow poison gas like chlorine and a bright silvery inflammable metal like sodium will react to give common table salt or sodium chloride, which is neither sodium metal nor chlorine gas, nor their sum or average."

Dr. Macaluso examined a large number of examples of synergy from diverse fields of industrial chemistry to determine if the many different systems displaying synergy possess any common factors in their mechanisms which can guide the industrial chemist in his work.

"The factors underlying all truly synergic phenomena," he stated, "were found to be self-association, packing effects, dissymmetry and inter-action of components. Thus mixture of an inert diluent with a solvent whose molecules are combined or associated with other molecules of the same substance may cause these associated molecules to separate, thereby altering the solvent properties."

These factors are important in making plastics.

"Synergy which is so common in pure or theoretical chemistry as to hardly merit notice," he continued, "acquires tremendous importance in applied chemistry. It means tripling the effectiveness of an insecticide or doubling the yield of a reaction. It represents a saving of time and money, conservation of materials, longer life and better use for the creations of the chemist."

Armed with a knowledge of the nature of synergy, chemists can speed the solution of their problems and better realize the hidden possibilities of the materials with which they work.

Science News Letter, January 6, 1945

Trout get about two-thirds of their food from the waters in which they live and the remainder from a few inches of air above the water where insects may be caught on the wing.

SCIENCE NEWS

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Books of the Week

➤ **BOTANISTS**, and students of the life sciences generally, will find Stanley Cain's **FOUNDATIONS OF PLANT GEOGRAPHY** a challenging book. Prof. Cain endeavors to go beyond the concepts underlying present-day plant geography and to introduce more dynamic points of view. In doing so, he draws upon all available resources of ecology, paleobotany, and especially genetics. What he says is not intended for the final word, but rather as the opening statement of a new and far-reaching discussion (*Harper*, \$5).

Science News Letter, January 6, 1945

➤ **WOLVES** have been hounded practically to extinction over almost the whole of United States territory, only in Alaska is there sufficient wild country remaining for them to live as they always have lived. In **THE WOLVES OF MOUNT MCKINLEY**, an able biologist of the Fish and Wildlife Service, Adolph Murie, gives us a complete and close study of a major sample of this fauna, especially in its relation as predators on the Dall sheep. The text is livened with vivid little sketches and many good photographic illustrations (*Supt. of Public Documents*, 40c).

Science News Letter, January 6, 1945

➤ **LAST SUMMER**, word came of the tragic death in an automobile accident of Frère Marie Victorin, leading Canadian botanist. Fortunately for science, before his passing he was able to see through the press the second volume of **ITINERAIRES BOTANIQUE DANS L'ILE DE CUBA**, written in collaboration with Frère Léon, of Havana. All who are interested in tropical vegetation, and all who like to read clear, lucid French prose, will know how to appreciate this book (*Institut botanique de l'Université de Montréal*, \$2.50).

Science News Letter, January 6, 1945

➤ **SOUTHERN HORTICULTURE**, by H. P. Stuckey, is a gratifying addition to a growing literature of scientific textbooks intended specifically for use in Southern Educational institutions, and adapted for Southern materials and conditions. (*Turner E. Smith and Co.*, Atlanta, \$2.56).

Science News Letter, January 6, 1945

➤ **SNOWSHOE COUNTRY** is another vividly-written, beautifully-illustrated book of the out-of-doors by the well-known wife-and-husband team, Florence Page Jaques and Francis Lee Jaques. In a winter when travel is largely impossible, it brings a breath of the still, chiaroscuro beauty of the great North Woods (*Univ. of Minn. Press*, \$3).

Science News Letter, January 6, 1945

➤ **PROPHET** of the new concept of regional development, Morris Llewellyn Cooke, in **BRAZIL ON THE MARCH** (*Whittlesey*, \$3), gives us a rapid but provocative view of what is in prospect for our great neighbor nation. If even a part of the plans are realized, the Colossus of the North will before long find itself in company with a Giant of the South.

Science News Letter, January 6, 1945

➤ **PLANTS** that grow in the water are apt to be neglected—most humans are too dainty-

footed to go into wet and mucky places, yet some of the most fascinating botanizing is to be found in these watery habitats. As encouragement to get better acquainted with this flora, W. C. Muenscher offers **AQUATIC PLANTS OF THE UNITED STATES** (*Comstock*, \$5). Good, concise descriptions are supplemented with plenty of clean-cut line illustrations and distribution maps.

Science News Letter, January 6, 1945

➤ **MOST UNDERGRADUATES** shy off from the several excellent dictionaries of scientific words and roots, partly because of their relatively high cost, partly because of their formidable bulk. P. H. Yancey's **INTRODUCTION TO BIOLOGICAL LATIN AND GREEK**, is a thin pamphlet in size and sells for only 10 cents, it therefore gets away from these difficulties, yet is able to impart the essentials of an understanding in biological terminology. It constitutes the first number of the Bios Classroom Series (*F. G. Brooks*, Mt. Vernon, Iowa).

Science News Letter, January 6, 1945

Just Off the Press

AMERICAN AVIATION DIRECTORY, AVIATION OFFICIALS AND COMPANIES, UNITED STATES, CANADA & LATIN AMERICA, Fall-Winter, 1944-45—Wayne W. Parrish, ed.—*Telegraph Press*, 680 p., paper, \$5 (vol. 5, no. 2).

AUDELS REFRIGERATION AND AIR CONDITIONING GUIDE FOR ENGINEERS, SERVICEMEN, SHOP MEN & USERS—Edwin P. Anderson—*Audel*, 1242 p., \$4.

HIGH-FREQUENCY INDUCTION HEATING—Frank W. Curtis—*McGraw*, 235 p., illus., \$2.75.

MEDICAL USES OF SOAP, A SYMPOSIUM—Morris Fishbein, ed.—*Lippincott*, 182 p., illus., \$3.

OUR FLYING NAVY—*Macmillan*, 97 p., illus., \$3.75. (Text prepared with assistance of the Office of the Deputy Chief of Naval Operations, Air, Introduction by James Forrestal, Sec'y of the Navy, Preface by Arthur W. Radford, Rear Admiral, U.S.N., Foreword by Thomas Craven.) 80 full-color reproductions.

PERSONAL MENTAL HYGIENE—Thomas Verner Moore—*Grune*, 331 p., \$4.

WHAT ARE COSMIC RAYS?—Pierre Auger—*Univ. of Chicago Press*, 128 p., illus., \$2, (Tr. by Maurice M. Shapiro).

THE WOMAN ASKS THE DOCTOR—Emil Novak—*Williams & Wilkins*, 130 p., illus., \$1.50, 2nd ed.

CHEMISTRY

Green and Yellow Pigments Prepared from Plant Cells

➤ **GREEN** and yellow pigments from plants, of possible importance in medicine, can be prepared from the plant tissues and cells in which they are embedded by a new process which permits them to be kept indefinitely without deterioration, Dr. Sophia Berkman, Chi-

cago chemist, told a meeting of the American Chemical Society.

The process worked out by her and Dr. Boris Berkman, Chicago physician, eliminates the use of organic chemical solvents, hitherto considered indispensable for this kind of extraction, and depends on physico-chemical means altogether. Full details of the method employed cannot be disclosed at the moment, Dr. Berkman explained, because of a pending application for a patent, in which government-use rights are assigned royalty-free to the government.

Among the extracted pigments of which Dr. Berkman exhibited specimens to her audience were carotin and chlorophyll. Carotin is the yellow-orange material found in carrots, from which it gets its name. Abundant also in practically all green and yellow vegetables, carotin is the stuff from which vitamin A is made. Its importance in medicine is well established.

Chlorophyll is the green pigment that gives most leaves their color, and carries on the work of converting raw materials taken from air and water into sugar and starch with the aid of sunlight energy. Its possible value in medicine is at present a subject of intensive research.

Carotin, chlorophyll and other physiological pigments of their group are ordinarily impossible to keep very long, if they are exposed to the air, as they are oxidizable and not photostable. As extracted by Dr. Berkman's process, they will keep indefinitely without spoiling or losing their original physiological activity.

Dr. Boris Berkman is the man who "discovered" milkweed floss as a replacement for the world's lost supplies of kapok as a filler for aviators' vests and other life-saving equipment (*See p. 9*). He is now operating a government-built plant, where all the milkweed pods collected in a nation-wide drive will be processed. Quota for 1944 was set at 1,500,000 pounds.

Newest milkweed product to show promise is oil from the seed. Tests have shown this to be a good semi-drying oil, similar to soybean oil but more useful in paint because it has less tendency to turn yellowish. Preparations were made to process the great quantities of milkweed seed turned out by the floss-separating machines, and thereby make a valuable addition to available stocks of vegetable oils.

Science News Letter, January 6, 1945

There is no one "best" potato for dehydrating and no best growing area.

• New Machines and Gadgets •

❁ **REFRIGERANT** bottle to keep liquids cool has an inwardly projecting ice receptacle blown in one side. When the receptacle has been filled with ice a stopper is inserted in its neck to prevent leakage. Bottle and receptacle are all in one piece.

Science News Letter, January 6, 1945

❁ **FOOD DEHYDRATOR**, recently patented, consists of two separated chambers: a small steam compartment and a drying chamber. The prepared food, in perforated containers attached to a belt, passes through the steam chamber for blanching, then through a trapdoor into the drying oven.

Science News Letter, January 8, 1945

❁ **DEFEATHERING** compound to remove pinfeathers from plucked chickens is available in an improved form made of a mixture of rosin and petroleum wax. One dipping in the melted mixture gives a sufficient application to remove, when it has hardened, all the pinfeathers without breaking the skin of the bird.

Science News Letter, January 6, 1945

❁ **WHEELS**, quickly attachable to a rocking or straight chair without disturbing the occupant, make it possible to move the person easily. Two rubber-tired wheels on an adjustable axle, with drops for the rockers and cups for the rear legs of the straight chair, are placed in position by tilting the chair slightly forward.

Science News Letter, January 6, 1945



❁ **COLLAPSIBLE** container for drinking water, approved for American soldiers in the tropics, keeps contents sterile and cool. The semi-porous material of which it is made permits slow leakage through its walls as it hangs in the wind, illustrated above, and the evaporation lowers the temperature of the water.

Science News Letter, January 6, 1945

❁ **MANICURING SCISSORS**, so constructed that when the blades are closed together their ends form a cleaner for fingernails, have a file surface on the inside of one of the cutting blades. The other blade forms a cover for the file when the scissors are closed.

Science News Letter, January 6, 1945

❁ **A BABY WALKER**, convertible into a high chair by use of an attachable stand, is strong, economical and safe. The stand, preferably made of tubing, has a rectangular framing to serve as a floor support and horizontal brackets to engage the under side of the frame of the walking seat.

Science News Letter, January 6, 1945

❁ **HEATING APPARATUS**, to use some of the heat that ordinarily passes up a straight vertical flue, has an inside metal exit tube for the gases generated in the heater. This is surrounded by a larger tube down which air is forced into the room by an electric blower.

Science News Letter, January 6, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 240.

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Question Box

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INVENTION

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What sort of injection relieves the crippling from arthritis? p. 3.

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TECHNOLOGY

What can you do to keep shoe uppers from wearing out? p. 8.

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 20, 1945



Ditching Machine

See Page 42

A SCIENCE SERVICE PUBLICATION

BELL TELEPHONE LABORATORIES

*Exploring and inventing, devising and perfecting for our Armed Forces
at war and for continued improvements and economies in your telephone service*

RESEARCH, in the Bell Telephone System, has always been an expanding activity, growing with the scientific knowledge of the times and contributing to that knowledge.

The telephone, itself, was invented in the laboratory where Alexander Graham Bell was carrying on researches in speech and hearing and laying the foundation for the electrical transmission of speech. As time went on the telephone research program expanded to cover every science which gives any promise of improved telephony.

These researches and studies now include electrical communication of speech—both by wire and by radio—the transmission of pictures (television)—and many important projects for war.

There Is No End to Progress

Every new research gives rise to new inventions and to new lines for development and design. New inventions indicate new lines for more research. In the early years, this work was carried in part by the American Telephone and Telegraph Company and in part by the Western Electric Company, the manufacturing unit of the Bell System.

For many years, however, the work has been assigned to a specialized unit, Bell Telephone Laboratories, Incorporated. Theirs is the responsibility for the technical future of the telephone industry.

The policies and procedures of Bell Telephone Laboratories are distinguished by two characteristics. In the first place the Laboratories design for service. The con-

sideration is not the profit of a manufacturer, but the production of equipment which will give the best service at the lowest annual cost when all factors are considered, such as first cost, maintenance, operation, and obsolescence. The Laboratories make no profit and the equipment they design is owned and used by the telephone companies; and the emphasis is upon that use.

Organized Co-ordinated Research

In the second place the Laboratories design always with reference to the complete communication system in which the equipment is to play a part.

Reliable, economical telephone service, which is the product of its efforts, is not so much an assemblage of excellent apparatus as it is an excellent assembly of co-ordinated equipment—all designed to work together.

4600 People in Bell Laboratories

Bell Laboratories contributions to the Armed Forces derive in large part from the technical background that the Laboratories had acquired through their steadily maintained program of research. The Laboratories had special knowledge and skill which could instantly be diverted to war problems.

At the time of Pearl Harbor, over a quarter of the 4600 people in the Laboratories had twenty or more years of service. This breadth of background made possible many engineering developments outside the strict field of communication and these have been of value to the Armed Forces. So far the

Armed Forces and the O.S.R.D. have engaged the Laboratories on over a thousand major projects.

Most Laboratories developments, of course, have been in the field of electrical communication. Communication, not simply between individuals as in telephony, but also between mechanisms, as in the electrical gun director.

Leader in Electronic Development

The Laboratories techniques and electronic researches have produced many secret weapons for our country's Armed Forces. In World War I, they pioneered by developing radio telephone systems for talking between planes and between planes and ground stations. They also contributed methods and devices for locating enemy planes, submarines, and artillery.

In this war, Bell Laboratories have pioneered in the field of electronics. The Western Electric Company, which manufactures the designs of the Laboratories, is the largest producer of electronic and other war communication equipment in the United States and is now engaged almost exclusively in the manufacture of this equipment.

In war, Bell Telephone Laboratories devote their work to the needs of our Armed Forces. In peace, they are constantly exploring and inventing, devising and perfecting for continued improvements and economies in telephone service. Centralized research is one of the reasons this country has always had "the most telephone service and the best at the least cost to the public."

BELL TELEPHONE LABORATORIES



AERONAUTICS

Need More Airports

Only about 10 can accommodate planes of the B-29 Superfortress type; runways up to 7,000 feet long and 200 feet wide will be needed.

➤ AIRPLANES are at least 10 years ahead of airports and unless some means is found to provide airport facilities to accommodate giants of the sky currently used or contemplated, world air commerce is likely to suffer, reported Arthur Ayres, of Pan American World Airways, at the meeting of the Society of Automotive Engineers in Detroit.

Only about 10 of the 2,200 airports in the United States, and of the 250 military flying fields built around the world, can accommodate planes of the B-29 Superfortress type which will undoubtedly be adapted for postwar air travel, Mr. Ayres pointed out. He recalled that in 10 years the weight of commercial planes has increased about six and one-half times, so that runway length must be increased at least 3,000 feet.

The practicability of large aircraft is being solidly established by war-time air transportation, and the larger airports needed for an expanded civil air transportation system will require runways up to 7,000 feet long and 200 feet wide, Paul H. Stafford, of the Civil Aeronautics Administration, told the meeting. He stated that the present trend toward thicker airport pavements, using better materials and more exacting construction methods, may be expected to continue as aircraft size is increased.

Science News Letter, January 20, 1945

Reduces Fuel Consumption

➤ POSTWAR planes on flights around the world may be powered by an engine-turbine combination that is high in power, low in fuel consumption and generally more satisfactory than jet propulsion, C. F. Bachle, of Continental Aviation and Engineering Corporation, Detroit, told the meeting.

Reduction in fuel consumption will be a necessity for global transportation, he reported, and the engine-turbine now seems to provide an effective means of obtaining the greatest amount of propulsion energy from a given amount of fuel.

The turbine is fueled by the exhaust gas from the gasoline engine, Mr. Bachle explained. He rated the engine-turbine combination as having the highest ef-

ficiency for long-range flights at 300 miles per hour in that it provides a minimum weight of power plant plus fuel.

He predicted that jet propulsion turbines might replace piston engines when higher speeds become practical. Currently, the high-speed airplane is suitable only for special purposes because the larger proportion of its load-carrying capacity is occupied by the power plant.

Science News Letter, January 20, 1945

Two Engines in Trucks

➤ INSTALLATION of two engines in heavy trucks to give extra power was recommended at the meeting by Ralph M. Werner, United Parcel Service. Tests during the past 15 years indicate that dual-engined vehicles are efficient and economical, he said. The two engines may operate simultaneously at all times or one may be used only when extra power is required in hill climbing or in mud and snow.

The use of multiple power plants in trucks is by no means a new idea, he explained. It has been tried both in Europe and in America. A truck built in the United States in 1930 was a three-axle unit equipped with two 135-horsepower eight-cylinder engines. Others were built later. In one, which Mr. Werner himself designed, one engine was placed at the rear of the rearmost axle and the other just ahead of the first driving axle.

Costs of building and operating a truck equipped with a single 200-horsepower engine and one with two 100-horsepower engines were contrasted by the speaker. For the two-engine installation the cost will be only 30% of the cost of the single engine with twice the power, he said. When transmissions, clutches, and extra axles are taken into consideration there is still a saving.

"It is conceivable," Mr. Werner concluded, "that on a complete installation of this kind the saving might well run as high as 50%."

Science News Letter, January 20, 1945

Anti-Icing Equipment

➤ HEATED airplane wings are being tested as anti-icing equipment for aircraft by the Army Air Forces, Lt. Myron Tribus, of the Air Technical Service



WINGED LABORATORY—In a specially equipped B-24 Liberator "flying lab" research engineers of the Sperry Gyroscope Company are shown making instrument tests and performance records under actual flying conditions.

Command, Wright Field, told the meeting.

Army experiences and tests made with the B-17 Flying Fortress, B-24 Liberator bomber, and the Lockheed 12-A Light

Bomber, have indicated that the amount of heat which must be supplied in flight is less than indicated by wind tunnel and dry-air flight tests.

Science News Letter, January 20, 1945

MILITARY SCIENCE

More News of V-2

Enough fuel is consumed by this Nazi terror-rocket in less than five minutes to supply eleven "A" card holders with gasoline for a year.

➤ GERMAN V-2 ROCKETS use up more fuel in less than five minutes than eleven "A" card holders receive in a whole year under present rationing regulations. This calculation is based on figures published in the British magazine *Flight*, which state that one V-2 uses up 8,000 pounds of fuel in the time of flight, which from launching to impact is about five minutes. That means they use up roughly 1,142 gallons. An equal amount of 100 octane aviation fuel would be enough to power one of our four-engine B-24 Liberator bombers, with 2.5-tons of bombs, on a five-hour bombing mission.

The report confirms earlier estimates that for the present range of about 200 miles from launching site to target the maximum altitude reached by the V-2 is over 60 miles from the earth's surface. However, it goes beyond the earlier reported maximum speed attained by the rocket, 3,000 miles an hour, to state that a velocity of 4,500 miles an hour is probably more accurate. At this high speed the friction developed is so intense that V-2's have been observed glowing a dull red.

The rocket is launched vertically under its own power. Only a concrete platform or a good road is required, with a simple structure to support it in upright position. In this respect it has an advantage over the V-1 "buzz bomb." The turbine is started up and pumps deliver fuels, alcohol and liquid oxygen, mixed with peroxide and permanganate, to the combustion chamber. The fuel is ignited by an electric spark, causing the mixture to burn violently. The steam and carbon dioxide, products of combustion, are projected at high velocity through the nozzle at the back of the rocket, giving it an initial thrust of about 26 tons.

After take-off the rocket makes a vertical, accelerating climb for about 60 seconds. Then a gyro comes into operation, under the control of a time mech-

anism, barometer, or perhaps radio control, and with the aid of a servo mechanism, a small motor, moves the steering vanes to alter the angle of flight from vertical to about 45 degrees in the direction of the target. As fuel is consumed, the rocket becomes lighter. The thrust is constant, and consequently the rocket is speeded up. At the same time the density of air is reduced, and this resistance is lessened, and the rocket further speeded up while under power. This explains the initial vertical flight, which is executed to take the shortest path through the relatively dense layer of air near the earth's surface. This factor of air resistance makes clear why the Nazis are reported to be setting up V-2 launching sites on mountains. Every increase in the initial launching altitude lessens the energy which must be expended in reaching the rarefied air where really high velocities can be attained. The article states that for this reason, reports that V-2's will be launched from the mountains of Norway should not be dismissed as impossible.

Science News Letter, January 20, 1945

AERONAUTICS

Fast Towing Tractor for Heavy Bomber Take-offs

➤ BIG BOMBERS and heavily loaded transport planes need a great deal more engine power for take-off than they do in normal flight. Their engines must strain until they are air-borne, then the pilots can throttle down. This means that a considerable part of the powerplant is dead weight except for the few minutes spent in thundering down the runway.

To avoid this overloading of the engines is the aim of a take-off system on which U. S. patent 2,366,892 has been issued to Maurice L. Donnellan of Ypsilanti, Mich. He provides a powerful, high-speed tractor, with a swivelled pillar to hold up the nose of the airplane while

the vehicle races along, adding the traction of its motor to that of the plane's engines until the wings take hold on the air. Then the hookup is released and the plane leapfrogs over the tractor and is on its way. The vehicle can, of course, also be used for ordinary utility plane-towing jobs around the airfield.

Science News Letter, January 20, 1945

A new hybrid corn and several new varieties of sorghum in the United States are now producing special starch for adhesives and food of the tapioca type to replace cassava formerly obtained from the Dutch East Indies.

SCIENCE NEWS LETTER

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MILITARY SCIENCE

Yankee Doodle Robomb

It can reach a speed of 400 to 440 miles an hour at an altitude of 6,000 feet and achieve a theoretical range of about 150 miles.

➤ USING A FIVE-PAGE Allied Command report, a photograph from a popular magazine, some badly mutilated engine parts, and America's best technical minds under the supervision of Col. D. J. Keirn, of the Air Technical Service Command, Wright Field, we began last August 9 to develop the Yankee Doodle robomb. Credited for a large part of the developmental work on the jet propulsion engine that powers our robomb is the Ford Motor Company, of Dearborn, Mich.

It took three weeks to complete the first robot bomb propulsion engine that could be successfully operated, once the work was begun on the basic design. Today America has a good robomb which can be used if needed, but we may never need it, for the Army Air Forces does not favor indiscriminate bombing attacks.

The Yankee Doodle robomb can reach a speed of 400 to 440 miles an hour at an altitude of 6,000 feet and achieve a theoretical range of about 150 miles. It is about 80 miles an hour faster than the Nazi V-1 weapon.

A feature of the Yankee Doodle robomb is its rocket-propelled launching car, announced for the first time in *Air Force*, the official service journal of the U. S. Army Air Forces. In operation the jet engine is started by a sparkplug in the top of its combustion chamber, with the power supplied from an outside source. It runs with a rich yellow flame until the external air supply is shut off. The engine then emits a blue flame as it develops greater thrust force. This change in color occurs when the oxygen content of the gases in the combustion chamber is reduced. Thirty seconds after the bomb engine has started the launching rockets are fired, and the robomb soars into the air, together with the launching car. When it reaches a speed of 260 miles an hour, the rocket-propelled launcher drops off and the flying missile continues on its way by jet propulsion.

The wingspan of the Yankee Doodle robomb is 17 feet 8 inches. From nose to tail the robomb measures 24 feet. It houses a magnetic compass, a 2,080-pound high-explosive charge, a fuel tank with

capacity for 157 gallons of low-grade gasoline, compressed air bottles which supply air for operating servo motors and for pressurizing fuel, a radio transmitter, and an automatic pilot.

On the nose of the fuselage is an air log propeller, like a tiny windmill, which counts up air miles until a pre-determined number is reached. At this point the robomb is supposedly over the target. The air log then flips the controls, causing it to go into a dive.

Science News Letter, January 20, 1945

CHEMISTRY

New Tangerine Syrup Developed by Chemists

➤ A TANGERINE SYRUP rich in sugar and vitamins, and two types of beverage bases have recently been developed by research chemists C. D. Atkins and E. L. Moore of the Florida Citrus Commission in cooperation with chemists of the Bureau of Agriculture and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture, at the Citrus Products Laboratory, Winter Haven, Fla.

The products have already attracted the attention of several local citrus-processing plants, that have available equipment necessary for their manufacture. The production of these concentrates, together with other existing commercial tangerine by-products, is expected to help return to the farmer some of the growing and picking costs.

Because difficulties have been encountered in the commercial canning of tangerine juice, a syrup with a light-brown color and a sweet fruity taste has been developed from the juice of tangerines. In preparing this syrup, firm cull tangerines are washed and passed through a screw press. Then the juice is screened to eliminate large particles of peel and pulp, neutralized and filtered, and vacuum concentrated.

The brown, honey-like product may be bottled attractively for home use as a table syrup rich in fruit flavor and vitamin C. Or it may be put in large containers for shipment to manufacturers of other products as a source of sugar and



VITAMINS—For use as a syrup or beverage base, this tangerine juice concentrate is being prepared in the laboratory by C. D. Atkins, one of the chemists responsible for developing the process.

vitamin C, or as a substitute for glycerine.

Other tangerine juice concentrates of fine commercial possibilities are the tangerine beverage bases that contain all of the natural fruit acids. In the preparation of beverage bases, whether or not the screened juice is filtered out depends upon the transparency or type of product desired.

After it has been vacuum concentrated, the syrup is pasteurized, bottled and held in storage at 40 degrees Fahrenheit until used. It possesses a fine fruit flavor, excellent retention of vitamin C, and in addition a high acid content which is desired by the beverage industry.

Technical details of the process are reported by Mr. Atkins, Mr. Moore and J. L. Heid in the *Fruit Products Journal*.

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Magnesium has an unusual attraction for oxygen; because of this it is highly desirable for flares and incendiary bombs but harder to handle in engineering and construction materials.

Reductions recently made in the amount of *tetraethyl lead* going into civilian gasoline will save enough lead to produce over 200,000,000 gallons of 100-octane aviation fuel for the armed services.

ENGINEERING

Life-Size Copper Man

He reproduces the heating effect of the human circulatory system and will be used as a test machine for electrically heated flying suits.

► A LIFE-SIZE copper man that reproduces the heating effect of the human circulatory system, to be used as a test machine for electrically heated flying suits and other similar equipment, was exhibited in New York by the General Electric Company at the National Retail Dry Goods Convention. Later it will be used in a cold room with temperatures far below zero at the Bridgeport, Conn., plant of the company in research and routine testing.

Electrically warmed clothing is a vital necessity for members of bomber crews three to seven miles above ground, where the temperature may be 70 degrees below zero Fahrenheit, and much research and development has been carried out to produce satisfactory suits. Formerly human beings were used in the cold room tests but they were not entirely satisfactory because different human volunteers reacted differently and the same person differed in reactions at different times.

The copper man, which duplicates almost exactly the human temperature system, was developed to relieve human beings of the extreme discomforts and possible injuries of long hours during testing in extreme cold, and to assure uniform results because the reactions of the metal man are always the same. The cop-

per man exhibited is the second one made by General Electric. The first is already in use at Wright Field, Dayton, Ohio, and has proved its worth.

The General Electric model is a perfectly formed human body five feet 10½ inches tall with a copper covering 1/16 of an inch thick. A complicated system of electric wires is connected with separate areas of the copper head, torso, hands and feet. The body is divided into 15 such areas, each being subject to separate control. The marvel of the copper man is that he is so wired and circuited that he practically reproduces the varied heat of different parts and members of the body. Even cold feet on a warm body can be simulated.

In testing, the copper man is left in the cold chamber but the wiring comes out to a control panel in another room. Here the engineers sit in comfort and take readings from the instruments as they regulate the copper man and the conditions in the cold chamber at will. The controls can be set so that the electric energy is equivalent to that of normal metabolism, less exhaled heat. Then the copper man represents a person at rest and can be used for testing electrically heated blankets.

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COPPER MAN—He will save human volunteers from the suffering of low temperature tests of electrically warmed clothing for the armed forces. Robert Sambleson, General Electric engineer, makes notes as the copper robot reproduces the human temperature system.

the attacking fighter plane has to fly through the blast, which frequently is strong enough to turn the plane completely over. Pilots report that when one is exploded in the air it appears as if the sky erupts in a great orange-and-black flash. The blast waves travel at a speed greater than that of sound, and it is only because modern fighters are stressed to withstand compressibility effects that very little damage occurs to the plane.

The range of the present V-1 is over 150 miles, with a speed in level flight of between 300 and 350 miles an hour. The explosive is carried in the war-head, mounted in a thin casing (to achieve maximum blast effect) in the front part of the mild-steel fuselage. The projectile is painted dark green on top and light blue underneath.

Trained civilian spotters, watching from high buildings, report the location of each bomb as it crashes. A few moments later members of the National Fire Service, made up of rescue and medical personnel, are on the scene. Even after the worst incidents all victims are usually extricated within an hour.

British Civil Defense services have evacuated over 14,000 patients from hospitals in the London area during the big bombardment, and mobile first aid units

MILITARY SCIENCE

Buzz-Bomb Defense

Tactics used by the British to knock the V-1 out of the sky is to attack at anywhere from 150 yards up to 440 yards. May be duplicated here.

► THE CHANCES are that the Nazis will use a smaller bomb than the 4700-pound V-1, which they have been using against England and in the European war theater since last June, if they fire on New York and Washington. It is probable that they may have found a way to reduce over-all weight and size but still carry 2,000 pounds of explosive in each bomb. If they use a smaller bomb it will be harder to knock out in the air by fighter plane or anti-aircraft fire.

The tactics used by the British to knock

the V-1 bombs out of the sky, as the red flare of their jets advertises their presence, is to attack at anywhere from 150 yards up to 400 yards. The attacking plane often flies in from the rear and with 20-millimeter cannon fire either wrecks the jet engine, puts the gyro pilot out of action, or explodes the bomb. When the flying bomb is shot down and explodes on the ground, the pilots say that they can see a ring of blast as it streams outward from the explosion.

If the explosive is detonated in the air,

attended to 40,000 minor casualty cases.

Flying glass is one of the chief causes of casualties. The sound of breaking glass often follows the explosion of a flying bomb. Sometimes pieces of glass from splintered windows are hurled across a room and bury themselves like daggers several inches deep in the walls. This is all caused by the terrific blast effect which accompanies the detonation of the 2,000-pound warhead of the V-1's. The blast waves travel faster than the speed of sound, shattering windows and everything else that cannot withstand them.

On other occasions, observers report, glass will crumble into millions of tiny

pieces. One woman, standing in front of a plate glass window when it was shattered by a bomb blast, was not injured at all by flying fragments.

Bomb blast effects are unpredictable, and sometimes freakish. A flying bomb is reported to have exploded less than six feet from a beech tree, left the tree untouched, but shattered the roof and windows of a house fifty yards away.

Some of the Nazi V-bombs that have been hit, but not exploded, by anti-aircraft fire have been known to turn in their tracks and head back towards the place from which they were launched, like boomerangs.

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Mice Cancers Disappear

One of the new B vitamins has anti-cancer activity, mice tests indicate; no human application yet, but scientists are hopeful.

► **DISCOVERY** THAT one of the new B vitamins has anti-cancer activity is reported by four researchers of Mount Sinai Hospital (*Science*, Jan. 12).

The researchers are Drs. R. Leuchtenberger, C. Leuchtenberger, D. Laszlo and R. Lewisohn.

The discovery was made in studies with mice. It has not at present any application to cancer in humans. Of course the group hopes the discovery will turn out to be useful for treating human cancers.

The vitamin used has been called folic acid but at present scientists are calling it the L. casei factor. Tiny doses of this were injected into the veins of 89 mice that had spontaneous breast cancers. The injections were given daily for four to six weeks.

The cancers disappeared completely in 38 of the mice, or 43%, and 49 of the mice are still living. Of 60 cancerous mice that did not get the vitamin, no tumor disappeared, only 20 are living, and 14 developed new tumors. Only one new tumor was observed among the treated mice.

Whether the vitamin will have the same effect on cancer in humans is not known at present. At this time it is not possible to make tests on humans because there is not enough of the vitamin available. It is a relatively new vitamin. Its chemical structure is not known, so it cannot be manufactured in large quantities the way some of the other B vita-

mins can be. It is a difficult, costly procedure to extract it from natural sources and the yield is minute, about on the order of one part vitamin from 100,000 parts of source material.

How this vitamin acts to cause disappearance of cancer in mice is not known, either. The Mount Sinai researchers during the past seven years have found anticancer activity in a number of extracts such as material from spleen, yeast and barley. Suspecting that the anti-cancer material might be a vitamin, they investigated this rather new member of the vitamin B complex, the L. casei factor, with the results now reported.

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ZOOLOGY

Gory Dramas Enacted On Mouse-Sized Scale

► **LIFE-AND-DEATH** dramas of the animal world, as fierce and gory as a lion's attack on a zebra but reduced to a mouse-sized scale, take place nightly among the winter grassroots of our own land. The victims are field mice, the hungry predators are short-tailed shrews. Fragmentary evidences of these small tragedies have been collected and studied by Prof. W. Robert Eadie of Cornell University.

Shrews are sharp-nosed little animals which most of us never get to see; if we did see them we would probably sup-

pose they were another kind of mouse. However, they are not members of the rodent family at all, but belong to a voraciously carnivorous zoological tribe that feed mainly on insects, and hence are called the Insectivora. So meat-hungry are shrews that if two of them are caged together over night, in the morning there will be only one—slightly bulgy around the middle.

Prof. Eadie has made a careful study of the winter nests of several short-tailed shrews and particularly of bones, skin fragments and hair of mice found in the undigested food remains scattered about.

In 56% of all samples analyzed there were evidences that the shrews had been feeding on field mice. During the period of greatest mouse-eating activity the field-mouse population of comparable areas dropped from 80 per acre to 12 per acre. Prof. Eadie considers that "short-tailed shrews might thus have accounted for at least 14 to 27 mice per acre during the winter months. Circumstantial evidence points to a higher figure."

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Last of Life Is Best for Russian Dandelion

► **KOK-SAGHYZ**, the Russian dandelion used as an emergency rubber source, grows root substance faster and produces most of its latex content during the second half of its life, after its main flowering period is past, Dr. G. Krotkov of Queen's University, Kingston, Ont., reported. This is a matter of practical importance, he pointed out, because it gives an index to the best time for harvesting the plant.

During the first year of its life, before the peak of flowering, the kok-saghyz plant is busy "just growing." It produces a maximum of leaves, and keeps these very busy synthesizing proteins; very little sugar is to be found in them at this time. It also lays the foundation for its later rubber-producing activity by forming the bulk of the latex tubes in its roots.

In addition to their 10% rubber content, the dry roots contain 50% by weight of a carbohydrate known as inulin—the same stuff that is found in Jerusalem artichoke tubers. Inulin can easily be converted into sugar, and this in turn fermented into alcohol, Dr. Krotkov stated.

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New-Born Kangaroo Crawls Into Mother's Pouch

➤ ONE OF THE long-standing puzzles of the animal world has been solved. Thanks to the evidence of an on-the-spot observer, we now know how a new-born baby kangaroo gets into the pouch on his mother's abdomen, where he continues to grow until too big to be carried around.

A report of the actual birth of a gray kangaroo in a Bristol, England, zoo is given by Dr. L. Harrison Matthews of the University of Bristol in the Proceedings of the Zoological Society of London.

As soon as the baby is born, Dr. Matthews stated, the mother begins licking her abdominal fur in a two-inch path. With its eyes closed, and its mouth roundly open, the inch-long infant kangaroo starts crawling through the damp fur, using its forelimbs. When it reaches the end of a wet patch of fur, the mother begins licking again until another wet patch is prepared. This process is repeated until the baby has reached the pouch and crawled into it.

During most of the operation the mother kangaroo leans backward so that her abdominal wall is almost level, making it easier for the baby to crawl.

Until recent years, it was generally thought that the baby was deposited in the pouch by the mother, using her tongue to guide it along the surface of her abdomen.

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AERONAUTICS

Near Crash Results in Air Express Regulation

➤ THE NEAR CRASH of an Army Air Transport Command plane loaded with a ton and a half of rifle barrels for troops leaving for Attu has resulted in a new air express regulation. Today, when anything capable of influencing the magnetic field of a compass is destined to be flown by air, the words "Magnetic Material" must be plainly marked on the shipment, indicating that it requires special treatment.

Flying in Alaska with the cargo of rifle barrels, two United Air Lines pilots assigned to ATC operations discovered that their plane and Mount McKinley were about to have an argument. By skillful flying they avoided the craggy peak. Realizing that their compass must be off, the two flyers investigated and

found that the large quantity of metal in the rifle barrel shipment had created a local magnetic field which deflected the plane's compass approximately 20 degrees from its normal reading.

Special procedures have been set up because products containing iron might deflect the plane's compass from the correct reading. All large quantities of magnetic materials must be carried in the rear cargo compartment, as far away from the plane's compass as possible.

Magnetic materials acceptable as air cargo include only those items containing magnets with fields not confined. Included on the list are ammeters, galvanometers, magnetos, permanent magnets, motors or generators incorporating permanent magnets, photo-electric light meters, thermocouple meters, voltmeters and ferrous materials.

Magnetic materials carried in the plane's cockpit and front cargo compartment must be demagnetized before being loaded aboard the plane. This procedure has been established for a long time in airline maintenance.

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CHEMISTRY

New Precise, Rapid Method For Determining Vitamins

➤ RECENT developments in chemical methods for the determination of vitamins in foods are far more precise, rapid and less costly than the biological techniques carried out with test animals such as rats and guinea pigs. This is the opinion of Drs. Daniel Melnick, Melvin Hochberg, and Bernard L. Oser of Food Research Laboratories, Inc., New York.

"However," they explained, "the chemical procedures for liberating the vitamins from the materials to be tested are not exactly duplicated in the human digestive system. Thus all of the vitamin found in a product by chemical analysis may not be completely available to the body, the unavailable portion being of no nutritional value."

These investigators described a new technique which allows direct determination on the human subject of the availability of vitamins in a given product. They reported that the kidney excretion of the water-soluble vitamins, thiamin, ascorbic acid, riboflavin and niacinamide, parallels the dietary intake in studies with normal well-nourished individuals on standardized diets.

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PHOTOGRAPHY

Marks on Negatives Identify Stolen Cameras

➤ IF YOUR CAMERA is stolen from you, it is possible for police to identify it when later recovered even if you do not have any markings on it to show that it is yours. The identification, by an ingenious method devised by Constable R. Anthony, of the North Battleford City Police, Saskatchewan, Canada, makes use of the pictures taken with the camera.

Now that you can't buy cameras, the recovery of stolen cameras has become much more important, Constable Anthony points out in his report to the FBI Law Enforcement Bulletin published by the Federal Bureau of Investigation.

In one case he was able to recover a camera believed to be the one stolen from a car, but the camera had been well cared for and did not even have a scratch on it by which the owner could identify it. He asked the man who had lost his camera to bring in some of the negatives made with it. It was found that each negative had a peculiar mark on it like the impression of a hair or fine thread. Negatives made with the recovered camera were found to have the same imperfection. This established the identity and the owner got his camera back.

Nearly every camera, Constable Anthony has observed, leaves some sort of unusual mark on its negatives which can be easily spotted by a person trained in police laboratory methods.

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Coal Identified for Protection Against Theft

➤ AS A MEANS for sure identification of coal, crushed rock and similar bulk materials, R. E. Miskelly of Plymouth, Mass., proposes to spray them with a chemical that fluoresces on being irradiated with ultraviolet light; he has received patent 2,367,040 on this invention. The ordinary daylight appearance of the commodity is not changed, yet a means is thus provided for protecting it against theft, adulteration and other abuses.

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THE FIELDS

Thermal Cloth Developed To Line Aviators' Suits

➤ WARM, SOFT thermal cloth has been developed to line aviators' suits and for evacuation blankets for the wounded. Hundreds of pile tufts are woven on each side of the cotton warp, making the fabric exceedingly warm despite its light weight. The tufts tend to trap the warm air from the body and keep it from escaping.

The cloth was designed to replace sheep's wool in the jackets of aviators' flying suits since it does not harden in high altitudes as does the natural product. When used as a lining inside an outer shell of tightly-woven windproof fabric, it makes one of the warmest and most comfortable of flying garments.

To seal upholstery against the infiltration of dirt and to anchor more firmly the cotton warp and filling threads, fabric used to cover the seats of modern streamlined trains is coated with a latex compound. A coating process has been developed which permits air to pass through the fabric despite the coating: this makes the seat cooler and more comfortable.

Specimens of automobile upholstery, through which you can blow smoke even though the back has a rubber coating; of thermal cloth with the soft pile on both sides; and of upholstery for airplanes where light weight as well as durability is important, are only a few of the samples of upholstery fabrics made by Collins and Aikman Corporation which are contained in a kit prepared by Science Service.

The unit tells of the manufacture and care of upholstery fabrics and the various uses to which specialized fabrics have recently been put as well as postwar prospects for them. The Upholstery Unit of THINGS of science, containing the specimens and museum labels for their display, as well as suggesting a number of experiments, can be secured by sending 50c to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and asking for unit No. 50.

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CHEMISTRY

Luxuries from Coal Include Perfumes, Nylon

➤ DIAMONDS SPARKLED, perfume sent its gentle fragrance through the room and nylon stockings were encased in a locked display case. The label on these was "coal."

Since diamonds are made of carbon, one of the principal elements in coal, brilliant cut stones highlighted the "black magic" exhibited in New York. A pair of real nylon stockings, made of coal, water and air, was marked, "authentic nylons, circa 1939."

A perfume bar gave guests an opportunity to compare the odors of roses, carnations, gardenias, and violets, while a chemist showed how they are mixed individually. Lilacs and lily-of-the-valley perfumes as well as the woody and bouquet types all result from the chemist's utilization of coal tar to reproduce nature's product.

A table with a coal-finished top that will not burn was offered to the guests for use as an ash tray, and a fabric made spot-resistant by a coal treatment was demonstrated. Plastics at the show included a picture frame, woman's handbag and compact.

A few of the 10,000 colors and shades of dyes made from coal were shown. The red of a woman's lipstick and the black of her mascara, as well as part of the shine on a man's shoes, are derived from coal. The display was arranged by the Bituminous Coal Institute, which wanted the public to know that coal is used for something besides burning.

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Genes Sometimes Function Along With "Primers"

➤ GENES, the submicroscopic entities that determine the course of heredity within the cell, do not always reign alone, Prof. T. M. Sonneborn of the University of Indiana announced. He has found instances in which genes that determine certain factors or courses of events could not operate except in the presence of at least traces of other substances which he called "primers." He gave them this name, he explained, because their action is rather like priming a pump: you put a little in and you get a lot out.

Although primers are found in the general protoplasm of the cell, their origin is still tied up closely with that of the genes themselves; they arise with them if not indeed actually out of them. Prof. Sonneborn has also found evidence for the existence of primers in the cell nuclei, therefore in intimate association with the genes themselves, which are commonly conceived as chemical units in or on the chromosomes of the nucleus.

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STATISTICS

WAC's Daintier Appetite To Save Army \$2,700,000

➤ TAKING INTO consideration the fact that the average WAC has a daintier appetite than her GI brother will save the Army \$2,700,000 on its yearly food bill, a report from the War Department indicates.

The average WAC can be adequately fed on 650 calories per day less than her brother soldier, a difference amounting to about a quarter of a pound of steak and three medium-sized potatoes, or about a quarter of an apple pie. She eats nearly this much, 600 calories, more per day than the minimum recommended by the National Research Council for the moderately active woman, presumably because she is more than moderately active.

The \$2,700,000 saving expected by the menu adjustment to be made for the WACs will not, however, deprive them of beefsteak or apple pie. It will be accomplished by changes such as elimination of fried potatoes at breakfast. WACs don't go for potatoes at breakfast, the Quartermaster Corps finds, though they like them for other meals as well as the men do.

The average WAC prefers salad oil and French dressing for salads, whereas the male soldier prefers mayonnaise. The men want two eggs fried or boiled for breakfast and a second helping of sausage cakes. The WACs take one egg and 55% less sausage cake.

The average WAC drinks 25% less coffee, eats 25% less pastry (she prefers fruit for dessert), and eats 50% less assorted dry cereal, using, consequently, 15% less granulated sugar and 30% less syrup. Menus will be adjusted to these differences in eating habits and preferences.

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Naphtha Is Made into Aviation Gasoline

➤ CATALYTIC chemistry scores another advance in the process on which Alexis Voorhies, Jr., of Baton Rouge, La., was granted patent 2,361,138. It consists in the cracking of naphtha, and the re-arrangement of its atomic fragments into aviation gasoline, in the presence of a synthetic silica alumina catalyst, at pressures around 250 pounds per square inch and a temperature of 958 degrees Fahrenheit.

Science News Letter, January 20, 1945

ENGINEERING

Fuel Travels by Pipeline

Coal, as well as oil, may flow from mines to markets soon after the war by way of a system of "highways" hidden under the landscape.

By A. C. MONAHAN

See Front Cover

➤ COAL MAY BEGIN to flow from mines to markets soon after the war by way of a system of "highways" hidden under the landscape. Today crude oil, gasoline and natural gas are carried to their destinations by a great network of pipelines which covers much of the United States and has a greater mileage than railroads.

Pulverized coal, mixed with water, kept in agitation and onward motion by great pumps, passes readily through pipelines over great distances. At delivery plants the mixture can be dried and briquetted for burning in home and other furnaces.

The success of transportation through pipelines is due to American scientists, engineers and construction men, for pipeline transportation for fluid fuels originated in America. It is usually cheaper than cartage by railways and highways.

Three Great Pipelines

Wartime conditions forced the construction of three great pipelines for fluid fuels from the great production fields in the Southwest to the eastern seaboard or to other industrial areas. They forwarded the construction of shorter lines also but these three, because of the length and size, hold the limelight. They are the government constructed Big Inch, the Little Big Inch, and the privately owned natural gas line just completed from Texas to the Pittsburgh-Cleveland industrial area. The picture on the front cover of this SCIENCE NEWS LETTER shows a ditching machine gouging a trench through the fields of Mississippi for this newest pipe line. The Big Inch carries crude oil, and the Little Big Inch transports gasoline from southern refineries.

The Big Inch and the new natural gas line are both 24 inches in diameter and each is over 1,250 miles in length. The Big Inch delivers some 300,000 barrels of crude oil each day to the refineries in the Philadelphia-New Jersey-New York

area. The Little Big Inch is made of 12-inch pipe and carries gasoline 1,500 miles from Texas City, Texas, to New York. The new natural gas line exceeds in length by nearly 300 miles the famous Texas Panhandle-Chicago 24-inch line which, when completed in 1931, was the largest natural gas pipe-line in the world.

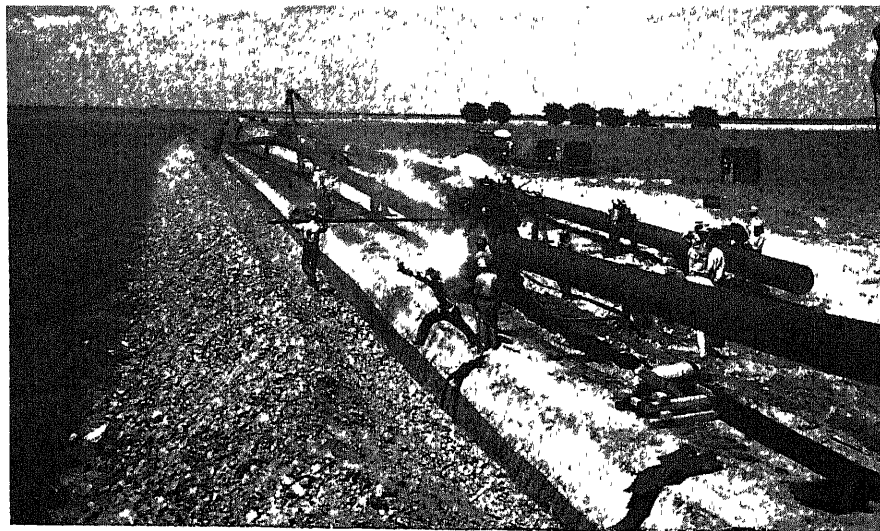
Many of the oil and gasoline pipelines in the United States are "common carriers" in the same sense as are the railroads, and are under the jurisdiction of the U. S. Interstate Commerce Commission. Approximately 90% of the total of some 130,000 miles carry crude oil. Some 70 companies operate common carriers.

Successful pipeline transportation of oil is the result of many years of work by scientists, engineers and construction men. The scientific problems to be overcome were numerous. The right kind of iron pipe had to be determined. Satisfactory joints were hard to obtain before arc-welding was developed.

Outside corrosion and rust protection for piping in acid soils, alkali soils, swamp lands, desert areas, and rocky mountain sides required special attention. Cutting to the lowest possible amount the inside friction to the onward passage of the oil was an essential. Then there were the hundreds of problems connected with the efficient working of the great pumping stations necessary at intervals of from 20 to 75 miles to keep the crude petroleum in motion.

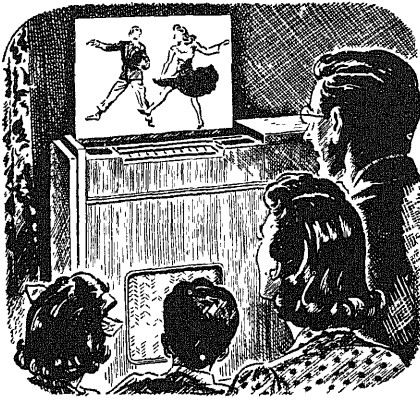
Some crude oils are so viscous that they must be heated before they can be pumped and others require heating only in cold weather. However, the greater part of the crude oils transmitted by long pipelines are of moderate viscosity because they contain a relatively high percentage of gasoline. These require no heating except perhaps in extreme cold weather in sections where the pipelines cross high hills and mountains. Efficient and economical heating equipment for the oils constituted another job for the scientists.

As a result of much scientific study and practical experience the laws that govern the flow of crude oil through



WILL CARRY GAS—Before it is dropped into the trench, a protective coating is put on the pipe of the Tennessee Gas and Transmission Co., destined to carry natural gas to the Appalachian industrial areas

General Electric answers your questions about TELEVISION



Q. What will sets cost after the war?

A. It is expected that set prices will begin around \$200, unless there are unforeseen changes in manufacturing costs. Higher priced models will also receive regular radio programs, and in addition FM and international shortwave programs. Perhaps larger and more expensive sets will include built-in phonographs with automatic record changers.



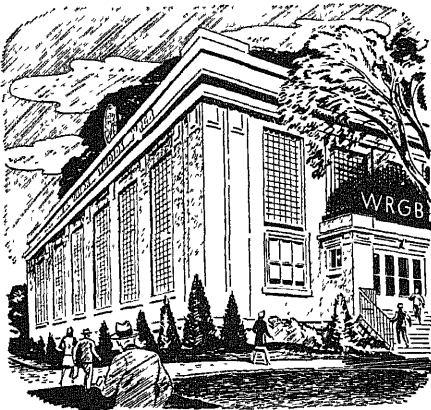
Q. How big will television pictures be?

A. Even small television sets will probably have screens about 8 by 10 inches. (That's as big as the finest pre-war sets.) In more expensive television sets, screens will be as large as 18 by 24 inches. Some sets may project pictures on the wall like home movies. Naturally, pictures will be even clearer than those produced by pre-war sets.



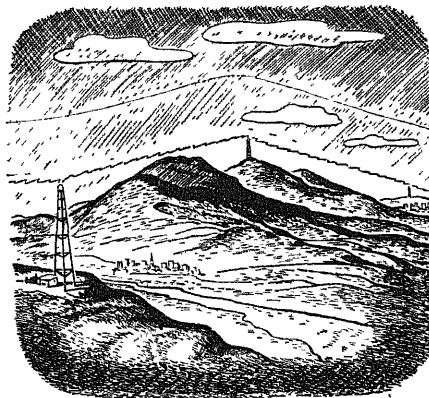
Q. What kind of shows will we see?

A. All kinds. For example: (1) Studio stage shows—dancers, vaudeville, plays, opera, musicians, famous people. (2) Movies—any moving picture can be broadcast to you by television. (3) On-the-spot pick-up of sports events, parades, news happenings. G.E. has already produced over 900 television shows over its station, WRGB, in Schenectady.



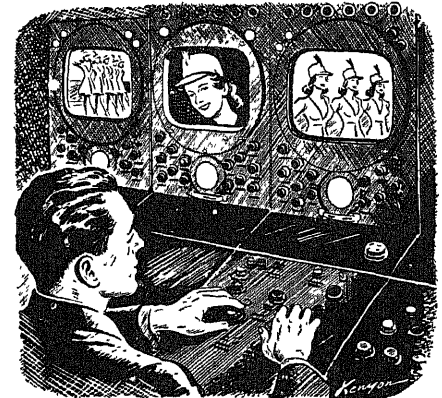
Q. Where can television be seen now?

A. Nine television stations are operating today—in Chicago, Los Angeles, New York, Philadelphia, and Schenectady. Twenty-two million people—about one-fifth of all who enjoy electric service—live in areas served by these stations. Applications have been made for more than 80 new television stations.



Q. Will there be television networks?

A. Because television waves are practically limited by the horizon, networks will be accomplished by relay stations. G.E. set up the first network five years ago, and has developed new tubes that make relaying practical. G-E station WRGB, since 1939, has been a laboratory for engineering and programming.



Q. What is G. E.'s part in television?

A. Back in 1928, a G-E engineer, Dr. E. F. W. Alexanderson, gave the first public demonstration. Before the war, G.E. was manufacturing both television transmitters and home receivers, and will build both after Victory. Should you visit Schenectady, come to WRGB to see a television show put on the air.

TELEVISION, another example of G-E research

Developments by General Electric scientists and engineers are helping to bring Victory sooner. Their work will bring you new products and services in the peacetime years to follow. *General Electric Company, Schenectady, N. Y.*

FOR VICTORY BUY AND HOLD WAR BONDS

Hear the G-E radio programs: *The G-E All-girl Orchestra*, Sunday 10 p. m. EWT, NBC—*The World Today news*, Monday through Friday 6 45 p. m. EWT, CBS—*The G-E House Party*, Monday through Friday 4:00 p. m. EWT, CBS.

GENERAL ELECTRIC

952-623-211

Do You Know?

A mold, *Aspergillus niger*, is found to be a valuable new test plant because it requires for growth the same minerals as green plants with the exception of calcium, silicon and boron.

A 75-year-old *limestone mine*, with some 12,000,000 cubic feet of space, near Atchison, Kans., is in use for the cold storage of government lard, eggs and other perishables; some refrigeration equipment will be required.

To make sure that the fuel line to a furnace is cut off when the blaze goes out, an *electric-eye* device focussed on the heating flame or pilot light is sometimes employed; if the fire goes out a warning signal is given.

New strains of *safflower* developed in the United States yield as high as 34% oil, a satisfactory substitute for linseed as a drying oil in paints; safflower grows at rather high elevations and requires little rain.

Army mules, still used as pack animals in spite of motorized equipment, weigh from 1,000 to 1,150 pounds and carry from 200 to 250 pounds; they are sure-footed on rough mountain trails and not seriously disturbed by battle noises.

From Page 42

pipes are now well known to petroleum engineers. A basic flow formula has been determined which takes into consideration the viscosity of the crude, its specific gravity, the diameter of the pipe, and other factors.

The quantity of oil that can be put through a pipe varies with the initial pressure on the petroleum, the pressure loss per square inch per mile, the density of the oil, the viscosity and other characteristics of the fluid handled, the diameter of the pipe, and to a certain extent the character of the terrain where the pipe is laid.

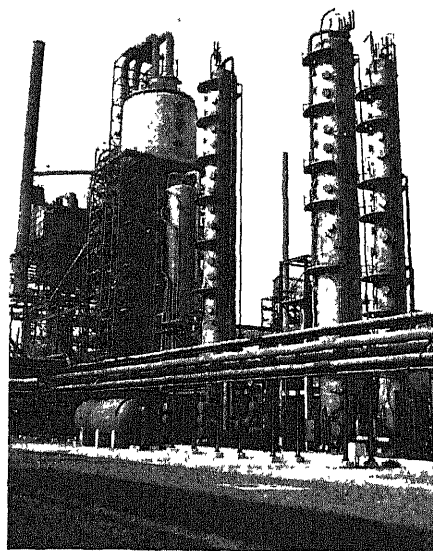
A pressure of from 800 to 1,000 pounds per square inch is the usual initial force put behind the oil. The pressure drop per mile varies from 10 to 30 pounds per square inch. Pumping stations must be placed along the line to keep the pressure well up. Usually this means every 40 to 45 miles, although often they must be much closer and sometimes may be placed much farther apart.

The capacity of a pipeline can be greatly increased, perhaps doubled, by doubling the number of pumping stations and increasing their installed horsepower. The cost of pipe in place and the cost of power are factors that the engineer must take into consideration.

The total investment cost per mile of pipelines varies with the diameter, terrain and other factors. Roughly it ranges from some \$10,000 per mile, including pumping stations, for six-inch pipe to \$60,000 for 24-inch pipe. While the large pipes cost much more than small pipes in total investment outlay, they cost much less when considered on a capacity basis. The cost per barrel per mile delivered through the 24-inch pipe is only about one-sixth the cost through a six-inch pipe.

From figures of the Interstate Commerce Commission it appears that the cost of transporting oil by pipelines owned by the larger companies coming under its jurisdiction is in the neighborhood of five cents per barrel per 100 miles. A barrel is approximately 300 pounds. In a 24-inch line the cost should be much lower.

In most cases the cost is much less than comparable railroad freight rates but is considerably higher than water shipment by tankers. For this reason most of the oil from the great Southwest oil-producing country in prewar days was piped to shipping points on the Gulf of Mexico and from there brought by boats to the eastern coast refineries.



FOR AVIATION FUEL—Pipelines make it possible for such refineries as the Baltimore plant of the Standard Oil Co. of New Jersey to continue turning out tremendous quantities of aviation fuel.

The first petroleum pipeline in the United States was probably a four-mile line laid in western Pennsylvania in 1865 to bring oil to the railroad from the wells in America's first important commercial field. The total oil pipeline network in America now includes some 130,000 miles.

The first real trunk line was constructed in 1879, connecting the west Pennsylvania fields with refineries on the seaboard. Its success led to the construction of others across the Appalachians. These were extended to gather oil from Ohio, Indiana and Illinois, and later pipelines were constructed to bring petroleum from the Oklahoma-Kansas area to the east coast and to Chicago, where a large refinery center had developed.

Prior to about 1920 the principal movement of crude petroleum from the Mid-Continent to the Atlantic seaboard was by these pipelines. The years following saw the development of the great Texas oil fields and of transportation by tankers from the Gulf and from California ports. Pipelines carried the oil to these ports, and the amount of oil carried direct to the east by pipelines decreased to a comparatively small figure.

Because of this decline, a number of eastern lines were taken up and one line was altered so that it could be used to take oil westward from the coast, an-



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other was made over into a gasoline line, and several were converted to transport natural gas from the west to the east.

The mileage of natural gas lines in the United States is about equal to that of oil pipelines. These lines make it possible to save and market much of the gas that would normally be lost in oil fields where gas is found in combination with petroleum, and also to bring to industrial centers for blast furnaces and boilers gas from wells that yield no oil.

Few householders realize the important part natural gas plays in industry. The first use of this fuel in the United States was industrial. It was put into use in 1820 in Ohio to evaporate brine in the manufacture of salt. Iron, steel, and ceramic industries are among the present heavy users. Early use by industry or for lighting was restricted to places near the source of supply. Scientists, however, changed the situation by developing a light steel pipe suitable for delivering natural gases over thousands of miles.

Natural gas fields are located in three principal sections, the Appalachian area, the Southwest, and in California. It is now available in the majority of the states in the Union, thanks to pipelines and the men who developed them.

Science News Letter, January 20, 1945

AERONAUTICS

Aircraft Bus Service For 1,000 Cities

► THE BUS industry proposes to establish scheduled helicopter-bus air service operating between bus stations in downtown sections of approximately 1,000 cities and towns, and between nearby towns, Agnew E. Larsen, president of RotaWings, Inc., has announced.

Numerous applications have already been made to the Civil Air Board for certificates of operation for helicopter-bus service by the nation's leading motor coach lines, Mr. Larsen remarked.

The engineering of helicopter buses, Mr. Larsen stated, is moving at a pace which should assure the operators and the public of a reasonably wide choice of air-buses. He cited the work of Igor Sikorsky, Platt LePage and Bell Aircraft. With a lessening of wartime restrictions, he pointed out, many models yet to be heard of should be taking flight.

Pointing to the statement of the CAB regarding helicopters, he said that that agency has taken "... happily a broader-minded view ... with regard to both the surface carriers and the helicopters."

The CAB regulations to which he referred state that the air transport services will be auxiliary, supplementary, and incidental to the other transport operations of an applicant for a certificate of operation. Continuing, the CAB points out that it cannot be expected to grant an application for service which cannot be performed except by the use of a helicopter which will not be obtainable for a number of years. The CAB will favor

proposals for limited experimental services when aircraft like the helicopter will be available reasonably soon.

"Transportation people are prepared to embark upon this new medium—the helicopter—and live with it through the admittedly experimental phases—such as the air transportation interests did through the 'twenties and thirties,'" Mr. Larsen said.

Science News Letter, January 20, 1945



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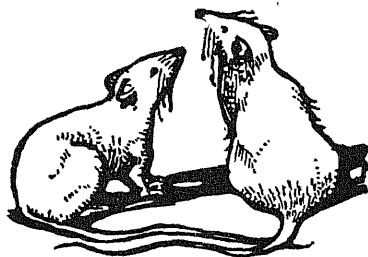
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Undomestic Animals

➤ BESIDES the animals he keeps in or about his house as working partners, food sources or pets, man has an assorted array of hangers-on that have lived with him so long that their common names reflect the association. As a rule, these names are indications of the part of man's habitat they have chosen to be their habitat as well.

"House," the widest and most inclusive of man's habitat-names, has been added as an adjective to the names of quite a diverse list: house mouse, house cricket, housefly, house sparrow, house

wren, and (in the tropics at least) house snake.

Parts of the house, or of its out-buildings, have also been incorporated into animal names: chimney swift, wall lizard, bedbug, barn owl, barn swallow, stable fly. And since a ship is in a sense a floating house, perhaps shipworm should be included in this category.

Some smaller animal forms have become so characteristic as infestants of man's prepared foods and fabrics that they are named for them. One thinks readily of such disconcerting beasts as cheese skipper and cheese mite, flour beetle and mealworm, and that humble worm dignified as the vinegar eel. Add also clothes moth, carpet beetle and book-louse.

Many persons, too squeamish to call a cockroach a cockroach, call it a water-bug, not so much because of any aquatic preferences on its part as because this particular pest seems to invade houses by way of plumbing lines and sewers. Apparently one of its other names, croton-bug, dates from the opening of water supplies to New York from the Croton reservoir, years ago, when many New York houses received their first blessings of plumbing—and their first curse of cockroaches.

Less artificial than houses and barns but still man-made rearrangements of nature are his gardens, orchards and other plantings. These parts of the human habitat also have their characteristically-named fauna; orchard oriole, garden snail, garden snake, garden spider, hedge sparrow, hedgehog.

Obviously, these unbidden guests in and around man's house receive the widest imaginable degrees of welcome. Orchard oriole and house wren we are always glad to see; house mouse and house sparrow are barely tolerated nuisances; housefly and clothes moths are intolerable pests. But whether we like them or not, most of them have been with us a long time, and with us they are likely to remain.

Science News Letter, January 20, 1945

national organization has been formed with headquarters in Chicago, and the first technical meeting is planned for Feb. 8 and 9. The new association is known as the American Society of Lubrication Engineers.

The objective of the association "is to put on a sound basis the fundamental precepts of lubrication," which it is believed will be of benefit to all phases of industry with their related problems. The society will also attempt to promote the training of lubrication engineers in engineering schools. C. E. Pritchard, Republic Steel Company, is president of the society, and B. H. Jennings, professor of mechanical engineering at Northwestern University, is secretary and treasurer.

Science News Letter, January 20, 1945

METEOROLOGY

Antarctic Continent To Have Weather Stations

➤ A CHAIN of postwar weather stations around the Antarctic continent to make possible long-range weather forecasting for the whole southern hemisphere was forecast by Lieut. Comdr. Lincoln Ellsworth, USNR, at the tenth anniversary meeting of the American Polar Society when he accepted honorary membership in the society.

The Antarctic ice cap influences the weather of the southern hemisphere, he declared, citing as an example that weather data gathered by whalers in the Antarctic region show that a cold winter in the Weddell Sea generally precedes a drought in the cereal belt of Argentina, 1,500 miles away.

Comdr. Ellsworth also declared that the mineral resources of the Antarctic regions would some day be exploited and used despite the many difficulties that would be encountered.

Science News Letter, January 20, 1945

MATHEMATICS DICTIONARY

Invaluable in reading any book that uses mathematics.

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The only such book now published, provides standard definitions of the terms and phrases from arithmetic through elementary differential equations, the technical terms ordinarily used in the applications of these subjects, and more advanced basic terms. Easy examples, many illustrations and all sorts of formulas are included. The appendix contains tables of weights and measures, a list of mathematical symbols and tables ordinarily used in handbooks.

This dictionary is a great deal more than a collection of definitions. It explains, illustrates and correlates, stressing especially those operations that are hardest to understand. One reader has called it "Ten texts in one." Second printing of Revised Edition, just off the press. Blue fabric binding, for \$3.00, from the Digest Press, Van Nuys, California, or Science News Letter.

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ENGINEERING

Lubrication Engineers Organize New Society

➤ THE IMPORTANCE of proper lubrication in machines of all types, from tiny wrist watches to giant locomotives, and in gigantic war aircraft operating through desert dust and stratosphere cold, is now recognized to such an extent by technicians and chemists that a

AERONAUTICS

P-47 Improved

➤ PROBABLY the biggest, heaviest single-engine fighter in the world, the P-47 Thunderbolt, has many new design features that improve its performance and cut production costs. Facts about the new developments were made known when the 10,000th P-47 came off the assembly line of the Republic Aviation Corporation.

The Thunderbolt has increased its radius of action to 637 miles, twice the previous Army rating. Through water injection it has added several hundred horsepower for emergency operation. Improved paddle propellers have added 400 feet a minute to the climbing speed. It has double the Army's strength requirement for armorplate protection for the pilot. Finally, it has increased internal fuel capacity in addition to modifications for carrying auxiliary wing fuel tanks. On missions of destruction, 1,000-pound bombs may be carried under each wing as a substitute for the auxiliary fuel tank.

Cost of the Thunderbolts to the Army has dropped \$23,150 in the past two and a half years. Omitting government furnished equipment, such as engine,

guns, radio, and so on, the cost for the first Thunderbolts was about \$68,750. Today, these same planes, as a result of improved design and efficiency in production, cost approximately \$45,600.

A long-range model of the P-47 is now ready to go into production. Known today as the XP-47N, the new plane has been specially designed for use in the battle of the Pacific. By February the new model will be in full production. Officials of the company refused to discuss the changes that have been made in the new model to equip it for use against the Japs.

It is likely that the new Thunderbolts will be operated from island bases close to Japan, since the plane is too big for operation from an aircraft carrier, and is not equipped with folding wings.

Today, Thunderbolts fitted with rocket guns beneath the wings are being used effectively against German armor. In Africa and Italy its high altitude characteristics proved it to be as good or better than any planes the Luftwaffe could muster. It has also been used as a dive bomber and for ground strafing.

Science News Letter, January 20, 1945

MATHEMATICAL AND PHYSICAL PRINCIPLES OF ENGINEERING ANALYSIS—Walter C. Johnson—McGraw, 346 p., illus., \$3.
WEATHER HEADLINES IN OHIO—George W. Mindling—College of Engineering, Ohio State Univ., 124 p., paper, 75 cents, (Engineering Experiment Station, Bull. no. 120)

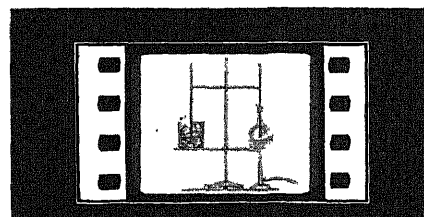
Science News Letter, January 20, 1945

CHEMISTRY

Plastics Made Lighter By Puffed-Grain Principle

➤ TO MAKE thermosetting plastics lighter in weight for certain purposes, Philip S. Turner of Williamsport, Pa., has applied to them the puffed-grain principle, long familiar in breakfast-cereal manufacture, in a process on which he has received patent 2,361,438. Moist starch grains are mixed with the plastic mass. When heat is applied, the water turns into steam, which puffs innumerable little cavities into the matrix. When the plastic cools and sets, the water condenses, but the lightening cavities remain.

Science News Letter, January 20, 1945



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1919 TWENTY-FIFTH ANNIVERSARY 1944

• Books of the Week •

➤ FOR SOMEONE GOING into the Navy or Merchant Marine, NAUTICAL MATHEMATICS AND MARINE NAVIGATION, by S. A. Walling, J. C. Hill, and C. J. Rees (Macmillan, \$2.75), will prove interesting and constructive reading. An excellent guide to navigation mathematics as applied to the seaman with self-testing questions and answers. Small boat owners, voluntary coastal patrol workers and others interested in sailing the sea should also find it helpful.

Science News Letter, January 20, 1945

➤ PATIENTS HAVE FAMILIES seems such an obvious fact that you might wonder why anyone should write a book about it. But, as Dr. Henry B. Richardson, author of the book with that title (*Commonwealth Fund*, \$3), explains, about the only signs showing the staff of large city hospitals that patients do have families are the occasional baby-carriage parked outside the entrance or the long lines of relatives waiting for elevators at the start of visiting hours. It is time, Dr. Richardson believes, that doctors learn the importance of the family in the patient's illness and recovery, just as they have learned to think of the patient as a sick person and not the gallbladder in ward five. Physicians, social workers, nurses and "the informed lay reader"

will find this account of the family study method informative and interesting.

Science News Letter, January 20, 1945

• Just Off the Press •

AMERICAN AVIATION DIRECTORY, AVIATION OFFICIALS AND COMPANIES, UNITED STATES, CANADA AND LATIN AMERICA, Fall-Winter, 1944-45—Wayne W. Parrish, ed.—American Aviation Associates, Inc., 680 p., paper, \$5 (Vol. 5, no. 2), Correction

BASES OVERSEAS, an American Trusteeship in Power—George Weller—Harcourt, 434 p., \$3.50.

COMMERCIAL METHODS OF ANALYSIS—Foster Dee Snell and Frank M. Biffen—McGraw, 753 p., illus., \$6.

COMMERCIAL WAXES, Natural and Synthetic, Including Properties, Uses, Methods of Handling and Formulas for Making Commercial Wax Compositions—H. Bennett, ed.—Chemical Pub. Co., 583 p., illus., \$11.

FAMILIAL SUSCEPTIBILITY TO TUBERCULOSIS—Ruth Rice Puffer—Harvard Univ. Press, 106 p., illus., \$2.

FORMALDEHYDE—J. Frederick Walker—Reinhold, 397 p., illus., \$5.50.

• New Machines and Gadgets •

⚙️ **NOVEL CHAIR**, recently patented, has a flat saddle-shaped seat and a paddle-shaped vertical back so that a sitter may sit at ease facing the wrong way. Arms project from the back but are unsupported from below so that they do not interfere with the legs of the sitter in reverse.

Science News Letter, January 20, 1945

⚙️ **MOBILE** airport lighting unit used in battle areas by the armed forces consists of a truck with an electric generator powered by the truck engine, and four 3,000 watt floodlights. The lamps sweep through a half circle arc and light up the field for a mile-long strip.

Science News Letter, January 20, 1945

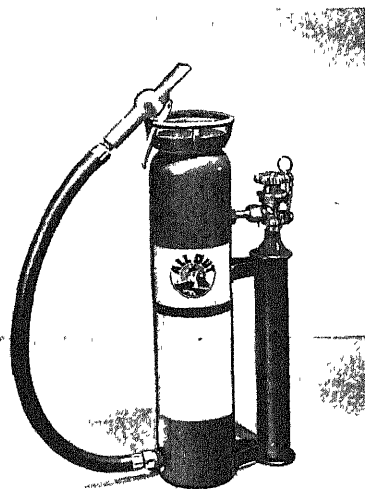
⚙️ **TREE-PLANTER** for setting seedlings and small stock in shelter-belt and reforestation areas is a tractor-drawn device mounted on a two-wheel frame. A double plow opens a furrow, a single plow deepens it; the planter, riding on a low seat, sets out the trees, and press wheels pack soil about them.

Science News Letter, January 20, 1945

⚙️ **CRUTCHES** for the lame, with headpieces which can be turned slightly under the arm, lessen shock in use. The head is made in two pieces, separated by coil springs, with flanges on the upper bowed armrest by which it is fastened on each side to the lower piece. This permits angular motion between the two parts.

Science News Letter, January 20, 1945

⚙️ **DRY CHEMICAL** fire-extinguisher, illustrated here, distributes dry powder through a flattened nozzle into the flames



where it immediately turns into a dense fire-smothering cloud. A replaceable cylinder of carbon dioxide shown on the right furnishes the pressure to drive the powder into the flame.

Science News Letter, January 20, 1945

⚙️ **STEPLADDERS**, with lateral braces that spread out when the ladders are opened, are safe from tipping sideways. The lateral legs are hinged to the top and are swung out by jointed braces at their centers which are connected with the braces of the ordinary stepladder.

Science News Letter, January 20, 1945

⚙️ **AN ALLOY STEEL**, recently developed, may be coated directly with

white or light pastel vitreous enamels on kitchen stoves, refrigerators and other household appliances. The alloy contains the rare metal titanium in combination with the carbon in the steel, forming stable titanium carbide

Science News Letter, January 20, 1945

⚙️ **ANTIFRICTION** door latch resembles the ordinary latch but has two parallel rollers inserted in recesses in the elongated latch bolt. The recesses open through the front and side edge respectively of the head of the bolt. The rollers touch each other.

Science News Letter, January 20, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 242

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Question Box

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What is the "copper man"? p. 38.

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How successful has one of the new B vitamins been in treating mice cancers? p. 39.

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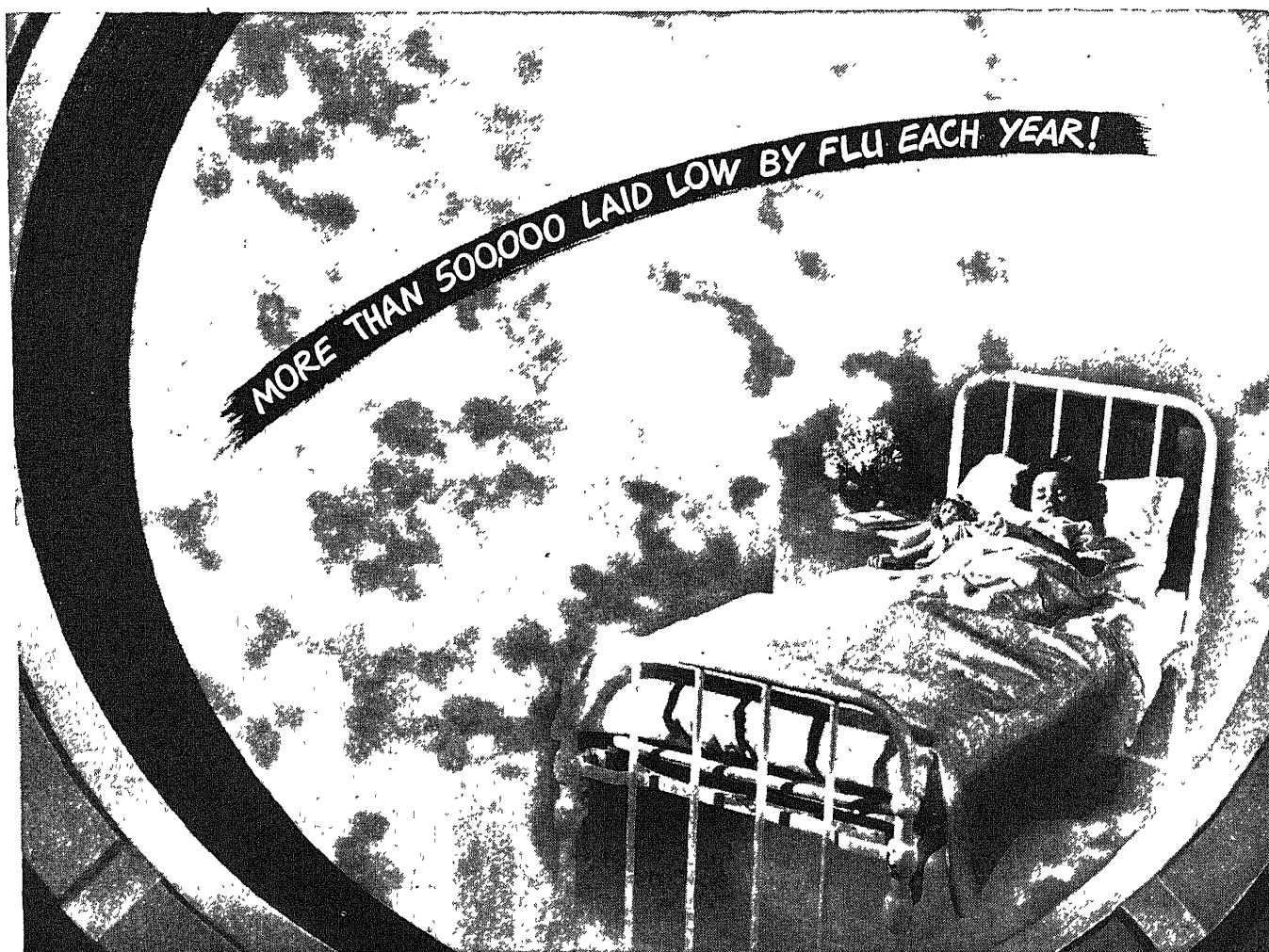
THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 27, 1945



Wellington Library.
Imperial Agricultural Research Institute
New Delhi.

Astronomy Lesson
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A SCIENCE SERVICE PUBLICATION



to destroy 'em you have to see 'em

Microscopes are gunsights in Medicine's battle on bacteria.

Optical microscopes, however, were not powerful enough to "draw an accurate bead" on the deadly virus that caused influenza.

But today, medical men have seen what no optical microscope could bring into focus—the infinitesimal influenza virus that previously had lain craftily camouflaged among larger cells.

This revelation came about through the Electron Microscope, developed by scientists at RCA Laboratories. And now, having been seen, influenza may be forced to unconditional surrender, saving the lives of thousands each year.

Here is but one facet of the genius shown by scientists behind RCA research... the

"ever-onward" research that saves lives or creates a better radio with equal skill... the "there-when-you-need-it" research that gave super-secret equipment to the United Nations... the "way-ahead" research that goes into everything made by RCA.

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Drs. Arthur Vance and James Hillier, scientists at RCA Laboratories, with Mr. E. W. Engstrom, Research Director (standing), examine the RCA Electron Microscope that has useful magnification up to 100,000 diameters, revealing unseen new worlds to the eyes of man.

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PIONEERS IN PROGRESS



MEDICINE

Heart Disease Treatment

Penicillin is advised for subacute bacterial endocarditis, if the ailment is due to a streptococcus sensitive to the drug.

► PATIENTS with the kind of heart disease known as subacute bacterial endocarditis, heretofore almost always fatal, should be treated with penicillin if the heart ailment is due to a streptococcus sensitive to the drug.

This advice is given to the medical profession in a report by Dr. Martin Henry Dawson and Dr. Thomas H. Hunter, of Presbyterian Hospital and Columbia University College of Physicians and Surgeons, New York (*Journal, American Medical Association*, Jan. 20).

It is based on apparent success of the treatment in 15 out of 20 patients. These patients are in excellent health, free of all signs of the infection that caused their heart trouble, and all but three are back at work, housekeeping, or whatever their former occupations were. They might be called "cured" except for the fact that the period since the treatment was stopped is only a matter of months and in a chronic disease such as this more time is needed to be sure the germs have really been defeated.

Of the other five patients, two relapsed as soon as treatment was stopped but they are in excellent general condition and the doctors hope they will yet be able to cure them. The other three patients died. In two cases the infection was still present at the time of death and in the third the situation was doubtful.

Since the report on the 20 patients was written, seven more have been treated. Of these, six are well and one relapsed and is now getting additional treatment.

Drs. Dawson and Hunter first used

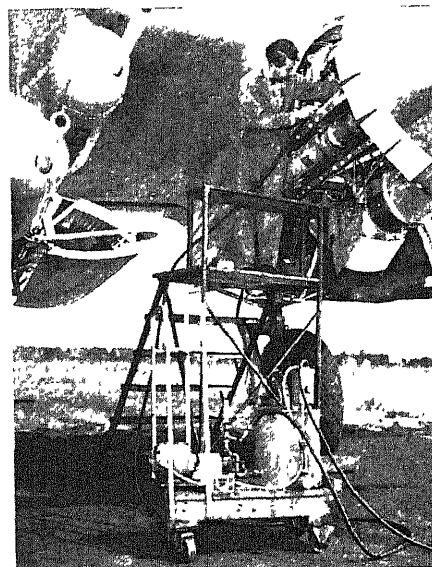
penicillin to treat subacute bacterial endocarditis in 1942 and 1943. The results were encouraging but because supplies of penicillin were then so limited, only two got enough to make recoveries. Another two have since been treated with larger doses combined with the anti-blood-clot chemical, heparin, and they also have now recovered. The fifth died of stoppage of a blood vessel in the brain but post mortem examination showed "substantial healing" of the heart condition.

Besides giving much more penicillin to the patients treated during the past year, heparin was also used. The combination of penicillin and heparin was first tried by Dr. Leo Loewe and associates at the Jewish Hospital, Brooklyn.

They tried heparin, with good results, because the germs that cause subacute bacterial endocarditis grow on the lining membranes of the heart in clumps mixed with fibrin from the blood. Buried in these clumps or clots, the germs are protected from chemical remedies circulating in the blood. Heparin counteracts the tendency of the blood to form clots in which the germs can grow safely and so should make the germs more vulnerable to attack by penicillin.

Drs. Dawson and Hunter found, however, that in five cases they got as good results without heparin as with it in other cases when large doses of penicillin were used. Giving this drug by continuous drip into the muscles instead of into the veins or by repeated injections into the muscles keeps more of it in the blood and is more comfortable for the patient, they report.

Science News Letter, January 27, 1945



PORTABLE PRE-OILER—This compact device delivers pre-heated oil under pressure to the engines of B-26 Marauders. Developed at the Glenn L. Martin Company, it has demonstrated its value both as a saver of man hours and a preventer of failures due to improper lubrication of an engine prior to its first start.

eases of the present war.

The blood's weapon against jaundice is the gamma globulin which is also medical science's most recent weapon against measles. Promising results with gamma globulin in jaundice are reported by Dr. Joseph Stokes, Jr., of Philadelphia and Capt. John R. Neefe, of the Army Medical Corps (*Journal, American Medical Association*, Jan. 20).

The gamma globulin is obtained from blood as a by-product in the processing of human albumin for treatment of shock. It was tried during an epidemic of jaundice in a summer camp for boys and girls last summer. It was given, by hypodermic injection into the muscles, to 53 out of 331 persons who at the time showed no signs of the disease, though the epidemic had been under way for over two weeks. About one-fifth, 20.8%, of those injected got sick compared with 67% among the untreated who developed hepatitis. None of the 53 treated, however, developed visible jaundice of the skin although three girls showed yellowing of the whites of their eyes.

The gamma globulin can apparently either prevent the disease or reduce the severity of an attack if it is given soon after a person has been exposed to it. This is comparable to its effect in measles. It might also be useful in treatment of

MEDICINE

Jaundice Weapon

Gamma globulin can apparently either prevent the disease or reduce severity of an attack if given in time, tests indicate.

► BLOOD DONATED to the Red Cross to save the lives of our wounded fighting men may also provide a weapon

to protect them against infectious hepatitis or infectious jaundice, which is said to be one of the most important dis-

jaundice if given before the skin-yellowing stage, the doctors suggest in their report.

"The results obtained in this epidemic are sufficiently encouraging to warrant further trials of gamma globulin in the

control of future epidemics of this disease," Dr. Stokes and Capt. Neefe state. "This is especially desirable because no other effective control measures have as yet been developed."

Science News Letter, January 27, 1945

MILITARY SCIENCE

Novel Military Devices

The Nazis have four-man sleeping quarters that can be rolled to the front line; Russians fit loud-speakers onto airplanes.

➤ **SLEEPING QUARTERS** for Nazi soldiers on the eastern front are being made with logs in the shape of a huge cylinder so that they can be rolled to the main line of defense by a team of horses. Each bunker is constructed from about 45 logs obtained from the forests in the area, and is equipped with bunks to accommodate four men. They are buried in the earth at a suitable depth and heaped over with earth.

This is only one of several examples of Allied and enemy ingenuity reported in *Military Review*, published by the Command and General Staff School at Fort Leavenworth, Kans.

Worried by the magnetic mines which the Allies have been latching onto the outside of their tanks, the Germans have developed a plastic coat, somewhat like rough linoleum, to prevent the mines from being attached. This coat is put on the exterior surface of the tank and colored with camouflage paint.

In World War I, the Germans used disguised freighters and fishing boats to trap Allied submarines and destroyers. When one of our boats would get in close to investigate, hidden guns would pop out and open fire. Today, German trains, beating a swift retreat from French battle lines, are trying to trap low-flying Allied strafing planes by waiting until the attacking aircraft has reached a low point over the railroad cars, then dropping the sides, uncovering rapid-fire Bofors anti-aircraft guns. Reports from the front indicate that they have not been very successful.

A further example of Nazi ingenuity is the use of turrets from knocked-out German tanks to form miniature fortresses. The turret, and its 75-millimeter gun, are removed from the damaged tank, sunk low in the ground, and imbedded in cement. A hole is dug adjacent to the emplacement to house ammunition and crew, and the surrounding

area is mined. British 17-pounders find it difficult to dislodge these tank-turret fortresses, and rocket-firing aircraft, which can dive straight onto the strong-points have found them difficult targets to hit.

But the Nazis do not have a corner on inventiveness or ingenuity. Reports from German sources, published in England, reveal that the Russians are using airplanes fitted with loud-speakers. These talking sky-giants fly low over concentrations of Nazi troops and civilian areas spreading propaganda designed to lower their morale.

The British have revealed a formidable weapon in a new special mortar mounted on a vehicle similar to a Churchill tank, the interior of which is designed to accommodate a large crew and special explosive charges. Known as the AVRE, the assault weapon hurls a charge containing many times the weight of explosive of any other known projectile of similar dimensions against concrete, steel, or masonry obstacles. This bomb is called the "Flying Dustbin." The AVRE is also equipped to carry and place in position carpets of flexible tracks (made from chestnut palings) to enable vehicles following after it to cross beaches, sand dunes, or patches of marshy ground.

The Royal Air Force is chasing cyclones these days in the Bay of Bengal with a long-range flying meteorological station. When land reports suggest that a treacherous storm is brewing, they fly out hundreds of miles deliberately seeking out bad weather. The flying meteorological station was put into use when it was discovered that ground reports might not give enough warning of devastating cyclones which spring up in that part of the world. As much as three days warning of the approach of bad weather can be given by making these weather flights.

Our own Wright Field's equipment

laboratory has developed special emergency equipment for the Air Transport Command's India-China Wing. This specialized rescue kit contains both Arctic and tropic accessories for crews that might have to bail out over snow-covered mountains or jungle areas when flying "over the Hump." Because some of the trees in the jungle grow to a height of 100 feet, and jungle growth makes parachutes difficult to spot, a 300-foot red and white streamer is attached to the kit to make it easier to spot.

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GENETICS

Chemistry Aids Genetics

Study of molds show how heredity is linked with ability to make from its food medium the necessary compounds to sustain life.

➤ CHEMISTRY has come to the aid of biology in solving some of the more difficult questions of how parental characters are passed on to offspring—and of how these characters sometimes change, giving rise to new evolutionary lines or pinching off old ones.

Specifically, it is biochemistry that is thus helping forward the study of genetics, Prof. G. W. Beadle of Stanford University declared, in a lecture given under the auspices of the Society of Sigma Xi at the University of Oregon. This was the first of a series of national Sigma Xi lectures by Prof. Beadle at various universities throughout the nation.

Earliest studies in genetics, like the classic researches of Mendel, concerned themselves with easily visible differences in organisms, such as color of flowers or seeds in plants, shape of wings or kind

of hair in animals. A great deal of profitable work is still being done along those lines.

However, plants and animals also have definite modes of inheritance in their invisible internal chemical reactions. What they do with their food, how they build it into their body substance, how they may sicken and die for lack of an indispensable hormone or vitamin, are as definitely controlled by their genes as are color, shape or size of body parts. These intricate reactions in life-chemistry are the present subjects of research by Prof. Beadle and his associates at Stanford University, and of other investigators elsewhere.

The special organism chosen by Prof. Beadle is a species of red bread mold, which makes a very desirable vegetable guinea-pig for a number of reasons, out-

standing among which are the ease with which it responds to breeding techniques and the sharpness of the differences its new strains show in their biochemical reactions.

The mold is induced to undergo gene changes by bombarding it with X-rays, ultraviolet radiation or neutrons. Sometimes a gene drops out of its makeup. In some of these cases, the result is a new strain of mold that cannot put together the simpler compounds in its food medium to make some necessary item in an organism's life-equipment—vitamin B₁, for example.

Ordinarily, of course, such a deficient strain would die, but by artificially supplying the lacking food element it is possible to keep alive and to continue studies on its hereditary behavior.

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CHEMISTRY

Wood Products Laboratory Opened in Washington

➤ A NEW LABORATORY for improved physical and chemical utilization of wood and its products was officially opened in Washington, D. C. The Teco-Shop Laboratory of the Timber Engineering Company is appropriately located in the middle of a wooded area. Hosts for the day were C. A. Rishell, director of research, and Harry Uhl, president.

The laboratory is composed of two divisions. Dr. Eduard Farber is in charge of the chemical division, which has already made advances in the study of the utilization of lignin, partner of cellulose in wood, but all too frequently regarded as a waste product. J. L. Stearns heads the physical department where soft grades of wood are made hard under impregnation. Gaily hued pieces of wood have been colored not just on the surface, but throughout, by this process.

The wood products development shop and wood chemistry laboratory are expected to provide an additional link between basic research organizations such as the U. S. Forest Products Laboratory and practical application of this research.

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AERONAUTICS

8-Passenger Helicopter Has Two Engines

➤ DESIGN DETAILS of a new helicopter that will carry eight persons reveal that it has two 300-horsepower engines and windmill-like rotor blades 56 feet



CHEMICAL LAB—A view of the chemical laboratory of the Timber Engineering Company in Washington, D. C., where research into lignin and other chemical phases of wood is conducted. Left to right are: Carl Rishell, Director of Research; Dr. Eduard Farber, Director of Chemical Research; S. Sibelius and Dr. M. Sciascia.

long. The length of the blades is greater than the wingspan of some of our top fighter planes, including the P-38J, P-40, P-47 and P-51. The two engines will thrust the craft through the air at a cruising speed of 90 to 100 miles an hour, according to Agnew E. Larsen, of Rota-Wings, Inc, the manufacturer, in a report (*American Aviation*, Jan. 1).

"The failure of one engine will not result in any appreciable change in the operating characteristics of the craft," Mr. Larsen remarked.

In the event of one engine failure it

would take less than one-tenth of a second to switch over to single-engine operation.

The overall height of the proposed helicopter is 13 feet. It will weigh 4,450 pounds and carry a load of over a ton. Estimated cost, without engines or radio, is \$37,000. Mr. Larsen states that the new craft can gain altitude at a rate of 1,400 feet a minute.

Construction of a mockup of the plane is beginning, and it is expected that the craft will be in production within a year.

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COMMUNICATIONS

Civilian "Walkie Talkie"

May become a part of your household equipment, following FCC approval. Bands set aside for industrial and medical radio to prevent interference.

➤ "WALKIE-TALKIE," the powerful one-man broadcasting station that provides reliable short-range communications between military units today, may become a part of your household equipment, just like your radio or refrigerator. Under the heading of "Citizens' Radio Communication Service" the Federal Communications Commission has allocated the portion of the radio spectrum between 460 and 470 megacycles to the new radio service.

The news about "walkie-talkie" for civilian use was released as a part of a preview of America's postwar radio spectrum in a proposed frequency allocation plan issued by the FCC.

Housewives will be able to keep in direct touch with their husbands, with "walkie-talkie" installed in automobiles and stores. Doctors, farmers and professional men can use "walkie-talkie" to keep in contact with their offices or homes while making calls. Department stores, dairies, laundries and other business organizations can use the service to communicate with their delivery vehicles.

No technical knowledge will be required by the FCC to operate one of these devices. "Walkie-talkie" equipment in one popular form consists of a small box containing transmitting and receiving devices, with a microphone and earphone built into a hand-set like a familiar telephone unit. It is powered by batteries, has a practical range of several miles and weighs about 35 pounds.

At FCC hearings in September, the railroads demonstrated that radio would contribute to the safety of life and prop-

erty and should be of almost universal benefit to the public. Therefore the Commission has set aside several channels for such use.

Three bands have been assigned for industrial and medical radio equipment, to prevent interference with other radio services. This means that a diathermy machine operating nearby will not interfere with the reception of programs on your radio.

Rural telephone service, a new communication service to furnish a radio-telephone link for isolated communities, farmers, ranchers, miners and others who cannot be or are not served by regular telephone wire systems, will share the band of frequencies allocated to television by the FCC.

Commercial television is going to remain roughly where it is, thus settling for the time being one of the most controversial questions discussed at the allocation hearings, whether television should stay in the lower part of the spectrum, or move to higher frequencies. In its report, the FCC stated that commercial television should not be denied the public until a system in the ultra-high frequencies can be developed and proven, since the time that may elapse before such a system can be worked out is indefinite and depends upon the resourcefulness of industry in solving many technical problems. However, the FCC has set aside space in the ultra-high portion of the spectrum for experimental development of color pictures and wide-channel television.

This means that you can expect about

the same kind of television pictures that were possible before the war, with some wartime improvements, and that television sets selling from \$75 up will probably go on the market soon after the war.

You need not expect to see television at your local movie house for some time to come. Since theater television is still in the experimental stage, the FCC has not allocated any specific frequencies for the service.

Likewise, no specific allocation is made for subscription radio, the service which would carry no advertising but would be supported by rental of a device to eliminate a "pig-squeal" superimposed on the program being broadcast.

You may be able to have a newspaper printed in your own home by facsimile broadcasting, a system that permits the transmission of printed or typed material, drawings or pictures through the air to be reproduced on paper exactly as they are sent at the receiving end.

Since public interest requires that FM (frequency modulation), staticless radio, be established in a permanent place in the radio spectrum before a considerable investment is made by the listening public in receiving sets and by the broadcasters in transmitting equipment, the FCC has allocated 90 channels to FM, an increase of 50 channels over the present space held by the service, and has moved it up in the radio spectrum to a point between 84 and 102 megacycles.

About 160 educational institutions have expressed interest in non-commercial educational radio which may profoundly affect not only American education but our democratic institutions as a whole. Therefore, the FCC has allocated 20 of the 90 FM channels to this service.

Criminals of the future will find the way of the transgressor harder as the police build up radio communication networks with a greatly-increased number of frequencies allocated by the FCC. These channels will make possible facsimile networks for transmitting photos and fingerprints from one police department to another and to the FBI in Washington. Fire departments will also be able to use radio, since the FCC has increased the space allocated to this service.

G. I. Joe, returning from war and desiring to set up his own amateur station, will have plenty of spectrum to work in. The FCC has boosted the number of channels for this service which is one of the oldest in radio, whose development closely parallels that of the entire radio art.

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MILITARY SCIENCE

It Takes 50 Shots

Yank aerial gunners can put a Japanese bomber out of action with 50 shots, according to data taken during a six-week period.

➤ **YANK AERIAL GUNNERS** can put a Japanese bomber out of action with 50 shots, according to accurate data taken during a six-week period on Guadalcanal. In the last war it took nearly 10,000 rounds of ammunition to put one airplane out of action. These facts were revealed by Col. Scott B. Ritchie, Assistant Chief of the Research and Development Service, Office of the Chief of Ordnance, U. S. Army, in an interview with Watson Davis, director of Science Service, on the CBS program "Adventures in Science."

The great improvement over the World War I record can be accounted for by the Army Ordnance research conducted during peacetime years. About 75% of the 1,200 major ordnance items now in use by our armed forces have been newly designed, or improved, since the beginning of the war, Col. Ritchie said.

"Great strides have been made in the field of materials since the beginning of the war," he pointed out. "Silk cloth was used as a container for propellant powder for many types of loading ammunition before this war. Silk was a strategic material because the Japs controlled practically all raw silk production, and artificial silks proved unsatisfactory. As a result of Ordnance research, suitable cartridge cloths of cotton were standardized. These cotton cloths not only overcame the shortage, but effected savings in cash which, during the first year of the war, amounted to more than the total amount of money allotted directly to research on explosives during the interval between World War I and World War II."

Research has brought forth new high explosives and new propellants for weapons to meet a variety of requirements.

Col. Ritchie expressed the view that the trend in explosives has been toward more powerful performance, with the usual safeguards with respect to dependability and safety in handling. None of the propellant powders used in the last war are being manufactured today for ordnance.

Many of our new explosives are based on a compound known by the code name RDX. These new explosives have greater blast effect than can be obtained with standard TNT. Hale-ite, another new explosive, has a greater power or shattering effect than TNT and differs in certain characteristics from RDX, he stated.

The powerful explosive used in the bazooka rocket is Pentolite, a combination of a very high explosive PETN, and TNT. PETN is too sensitive to be used alone, except in fuzes as primacord. Another explosive discussed by Col. Ritchie, is a plastic material which can be molded like putty with the hands so as to conform and stick to the surface of an obstacle, such as a tank. It will work under tropical conditions as well as at sub-zero temperatures.

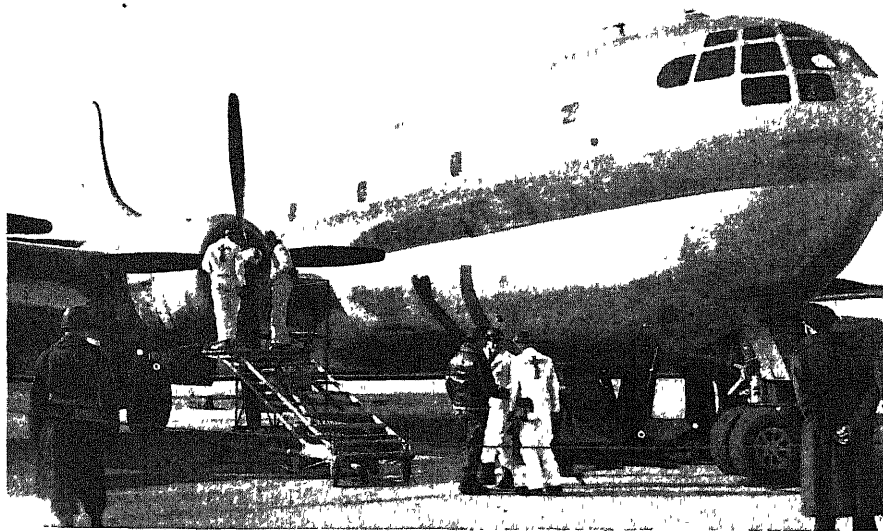
"Millions of our rockets of various types have been fired in combat and new developments are on the way," Col. Ritchie pointed out. He also stated that many of our most important weapons are still in their infancy.

Col. Ritchie told of the 120-millimeter antiaircraft gun, known as the "stratosphere cannon," that fires a projectile to an altitude of 60,000 feet. It can be used against land targets as well as aircraft. Our tank-destroying 90-millimeter gun can be fired accurately at a target 18 inches in diameter at a range of 6,000 feet.

"Our ordnance is superior to that in the hands of our enemies, but we can never remain satisfied. We must make absolutely sure that continuing research and development will keep it always ahead. Only in that way can we be certain that the peace we are striving for will endure," Col. Ritchie concluded.

Mr. Davis added that it is the responsibility and privilege of our nation's young scientists to help keep ordnance research alive. He pointed to the work of one of the Science Clubs of America in Webster Groves, Mo., where a group of boys built a rocket that shot through the air for a distance of 224 feet. It was made of one-half by five-inch brass tubing and filled with a powdered zinc-sulfur mixture.

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CARGO-VERSION—Designed for high speed, long range, large passenger capacity and low operating cost, this is the giant Boeing 377 postwar commercial air liner recently announced by the Boeing Aircraft Co. The airplane, a four-engine, two-deck transport developed from the famous B-29 Superfortress, is the first of the larger size super-transport of the future actually to have been built.

MEDICINE

Penicillin Plus Albumin May Prove More Effective

➤ MORE EFFECTIVE penicillin treatment may result from a new penicillin substance announced by Dr. Bacon F. Chow and Miss Clara M. McKee, of the Squibb Institute for Medical Research (*Science*, Jan. 19).

The new substance is a combination of penicillin and the albumin of human blood serum. Its promise of increasing the effectiveness of penicillin treatment is seen in the fact that, in mice at least, it is excreted from the body more slowly than the sodium salt of penicillin, the form of the mold chemical used for treating patients. The more slowly penicillin is excreted, the longer it can act on infecting microorganisms and the less is needed for treatment of a given case.

Several other methods of delaying penicillin excretion have been developed. This is the first report, the Squibb researchers believe, of a penicillin compound with a delayed excretion rate. The other methods involved suspending penicillin in oil, giving other chemicals with penicillin, or chilling the region where penicillin was injected.

Whether the penicillin-albumin combination is a true chemical compound is not yet known. The fact of its slower excretion suggests that it is. Unlike a similar combination of albumin and sulfa drugs, which some investigators believe has no germ-checking activity, the penicillin-albumin combination does have anti-germ activity.

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ENGINEERING

Tiny Ball Bearings Vital For Successful Bombing

➤ SUCCESS OF AMERICAN precision bombing depends upon the mass-manufacture of some of the smallest ball bearings in the world, reports Major R. J. Pask, of the Air Technical Service Command. These tiny ball bearings are a vital part of the Norden bombsight.

Until 1940, the smallest bearing assembly which American industry had produced had an over-all dimension of three-eighths of an inch in diameter, including inner and outer rings. The smallest ball being made in America at the time was one-sixteenth of an inch in diameter. Germany was supplying balls about one twenty-fifth of an inch in diameter.

In the summer of 1941 the foreign source of supply was cut off. As a result of research, the American ball bearing industry is now producing these tiny bearings in large enough quantities to meet the demands of the Army Air Forces.

The Norden bombsight, at that time, called for 61 ball bearings of 25 different types, upon which the actual operation of the bombsight depended.

Some idea of the sensitivity of the ball bearing assemblies can be gained from a "brush" test to which they are subjected. The bearing is first placed in a steel wheel, weighing exactly three and one-half pounds, then mounted on an axle. Next the hairs of an ordinary camel's-hair brush, like those used by artists, are drawn lightly over the heavy ring. This extremely light touch has to move the ring and bearing back and forth.

About 18,000 different kinds of bearings are being made today to supply war demands. The Army Air Forces alone require approximately 100,000,000 bearings in addition to 35,000,000 steel balls and 25,000,000 roller bearings.

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PHYSICS

Fused Magnesia Used in High-Temperature Lamp

➤ SMALL mercury-vapor lamps designed to operate at very high temperatures—hotter even than fused quartz will stand—are the subject of patent 2,367,595, obtained by John W. Marden of East Orange, N. J. To stand up against such temperatures, highly refractory materials such as fused magnesia or alumina are introduced into the quartz envelopes, either as sleeves or baffles. Rights in the patent are assigned to the Westinghouse Electric & Manufacturing Company.

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AERONAUTICS

Whirling Jets of Air Wipe Plane Windshield

➤ WHIRLING JETS of air under high pressure are substituted for the familiar rubber-edged arm of the automobile windshield wiper in a device for keeping the windshields of aircraft clear of water and ice, on which W. N. Patterson of Detroit has received patent 2,367,426. To make sure of dislodging the ice in winter, small quantities of alcohol or other non-freezing liquid are injected into the air-jets.

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IN SCIENCE

SEISMOLOGY

Japan's New Earthquake Centered Off Honshu

➤ JAPAN'S most recent earthquake was centered under the ocean floor off the coast of the Empire's principal island of Honshu, about 125 miles south of Tokyo. This epicenter determination was made by seismologists of the U. S. Coast and Geodetic Survey, on the basis of telegraphic reports forwarded through Science Service from three observatories.

The shock was not as severe as the big earthquake that shook Japan on Pearl Harbor Day, Dec. 7; it was apparently an aftershock of that disturbance. Point of greatest movement was in the region of latitude 34 degrees north, longitude 139 degrees east. Time of origin was 2:38.6 p.m., EWT, Jan. 12.

Observatories reporting were those of Weston College in Massachusetts, and the U. S. Coast and Geodetic Survey stations at Tucson, Ariz., and Honolulu, T. H.

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ENGINEERING

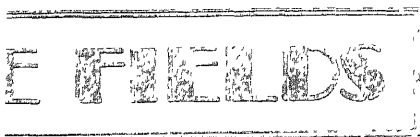
Coil Spring for Tractor Eases Work of Driver

➤ A SPECIAL coil spring, and a shock absorber, is the basis of a new suspension-type tractor seat which will take all the jolts out of riding the farm tractor over rough plowed land and ease the work of the driver. It may perhaps decrease the high degree of kidney and skeletal disorders among farmers blamed on the all-day-long tractor jarring. The new tractor seat was developed by the Monroe Auto Equipment Company, which developed and has made thousands of seats for war tanks.

The coil spring is placed directly under the driver's seat, and the triple-action hydraulic shock absorber at the rear. The absorber is similar to those commonly used in automobiles. Together the two devices give stability that enables the rider to stay level while the tractor bobs over rough ground.

The construction of the new device is simple and inexpensive, and it can be installed on all makes of tractors. It can also be applied to truck seats.

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ASTRONOMY

Pilots Learn Astronomy By Recognition Trainer

See Front Cover

➤ PILOTS ARE LEARNING astronomy through a new star recognition trainer, as shown in the official U. S. Navy photograph on the front cover of this SCIENCE NEWS LETTER. The stars are projected on the canopy through holes pierced at proper places in the globe shown in the foreground, as the globe rotates. This makes it possible for the instructor to demonstrate the relationship of the heavenly bodies to one another and explain their apparent motion as seen from the earth.

This is one of the many devices developed at the Navy Bureau of Aeronautics, Special Devices Division, under the direction of Capt. Luis de Florez, which aid in the realistic training of Navy flyers.

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MEDICINE

New Anti-G Flying Suit Weighs Only Two Pounds

➤ AMERICA'S NEWEST anti-G suit, which prevents fighter pilots from having a dimming or blacking out of vision during aerial maneuvers against the enemy, weighs only two pounds, Capt. George L. Maison, of the Aero Medical Laboratory, Wright Field, reports. Capt. Maison, who before the war was professor of physiology at Wayne University, and Lt. Col. F. G. Hall, of the physiology department at Duke University, are credited with the development of the anti-G suit, which both the Army and the Navy and some of our Allies now use as standard equipment. (See SNL, Jan. 13)

Weight has been an important factor in the development of the suit, Capt. Maison declares. The early anti-gravity pressure suits had valves weighing as much as 14 pounds. The British developed a very heavy suit which was filled with water instead of compressed air. This suit, developed early in the war, looked like a pair of duck-hunter's pants, and was very uncomfortable to wear.

The AAF G-suit is being used in the

European and Italian theaters, Capt. Maison stated. Pilots in AAF fighters, which are among the fastest aircraft in the air today, are provided with the suits. These planes can fly faster than 420 miles an hour and have an operational ceiling of 40,000 feet.

The new suit is a modification of one designed by the U. S. Navy, adopted after extensive tests on the human centrifuge at Wright Field. This human centrifuge was developed to measure the blackout tolerance of pilots and suits before, during, and after simulated power dives, building up pressures equivalent to from five to seven times the force of gravity, Capt. Maison commented.

The great success of the suit lies in the way it combats the effects of such forces on the body by applying pressure to the pilot's lower legs, thighs, and abdomen during aerial maneuvers, thus preventing blood from pooling in the lower extremities and permitting the heart to maintain circulation to the brain. Without the G-suit, forces which may amount to three to nine times that of gravity prevent the heart from pumping sufficient blood to the brain. This results in a blacking out of vision. The pilot usually remains conscious during a blackout, but unconsciousness may follow if the excessive force is prolonged a few seconds, Capt. Maison explained.

Pressure in the anti-G suit is supplied by air bladders. The bladders are inflated by compressed air from the airplane's vacuum instrument pump. It takes only two seconds to inflate or deflate the bladders when the force rises above or falls below twice that due to gravity. All the pilot has to do is zip on the suit and plug it into the air line before taking off.

The over-all effect of the G-suit, like the oxygen mask, the pressure cabin, and the electrically heated suit, has been to enable the pilot to match his tolerance limit with that of his airplane, Capt. Maison pointed out.

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GENERAL SCIENCE

New Secretary Elected for Smithsonian Institution

➤ THE BOARD of Regents of the Smithsonian Institution, at their meeting on Jan. 12, elected Dr. Alexander Wetmore to be Secretary of the Institution, succeeding Dr. Charles G. Abbot, who retired last June. Dr. Wetmore, well known for his researches in ornithology, has held the post of Assistant Secretary since 1925.

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CHEMISTRY

Shape of Large Molecules In Plastics Determined

➤ THE SIZE and shape of large molecules in plastics can now be determined rapidly and visually by the use of two instruments recently developed and tested in the laboratories of the Polytechnic Institute of Brooklyn. They will be valuable to manufacturers using various types of synthetic rubbers, plastics and fibers by extruding, molding, casting and spinning processes in which the size, shape and weight of the molecules play an important part.

Better rubber tires and shoes, plastic combs, buttons and other articles, and fibers like rayon and nylon, result when the size and shape of the molecules in the materials used are known. Viscosity is now used as a rough criterion for these fundamental properties; with the new instruments scientific measurements will replace this none too satisfactory method.

The two new instruments, based on simple visual observations through a microscope, employ the scattering of light to learn about the size, shape and weight of the large molecules in synthetic rubbers and plastics. The principle of the scattering of light was discovered in 1910 by Dr. Albert Einstein, and its application to computing molecular weight and shape of giant molecules was discovered in 1943 by Dr. Peter Debye of Cornell University. Dr. Paul M. Doty, of the Polytechnic Institute staff, is largely responsible for the development of the instruments.

Science News Letter, January 27, 1945

MEDICINE

AMA Cancels Meeting Scheduled for June

➤ THE AMERICAN Medical Association has cancelled its annual meeting, scheduled for Philadelphia, June 18-22. This action was taken by its board of trustees in order "to cooperate to the fullest possible extent with the request of the Office of Defense Transportation and in the interest of the nation's war effort" (*Journal, American Medical Association*, Jan. 20).

This is the fourth time in the Association's 95-year history, and the second time in this war, that an annual meeting has not been held. The other two cancellations, in 1861 and 1862, were also war-caused.

Science News Letter, January 27, 1945

ASTRONOMY

Jupiter Joins Venus

The two brightest planets are visible at the same time in the evening sky during February; Saturn is seen high in the sky.

By JAMES STOKLEY

➤ WITH THE COMING of February, the two brightest planets are visible at the same time in the evening sky. For the past few months Venus has been drawing eastward from the sun, and on Feb. 2 is at her farthest east position, setting about four and a half hours after sunset. At the same time Jupiter has been moving in a westerly, or "retrograde," direction in the sky. Until recently he was visible only after midnight, but this month he appears in the east less than three hours after sunset. This means that there is now a period in the evening, between three and four hours after the sun has gone down, that both planets are above the horizon.

Venus Appears First

Venus, in the west, is so brilliant that it appears long before any other star or planet, and is not difficult to locate. Jupiter, which appears low in the east, in the constellation of Virgo, the virgin, is less than a sixth the brilliance of Venus, but that still makes it brighter than any star. And in addition to these two, there is a third planet high in the south. This is Saturn, which stands in Gemini, the twins. Its brightness is about as much below Jupiter as that orb is fainter than Venus. As you look at them in the sky, however, the difference will not seem as great. Both Venus and Jupiter, when you can see both at once, are low in the sky; their light has to pass through a greater thickness of the earth's atmosphere than does that of Saturn, which is higher. If Venus and Jupiter were equally high, they would look considerably brighter.

Even Saturn is brighter than any of the stars now visible, with one exception. This is Sirius, the dog star, in the constellation of Canis Major, the great dog. This group and others are shown on the accompanying maps, drawn for approximately 11:00 p.m., war time, on Feb. 1 and 10:00 p.m. on Feb. 15. Canis Major is in the south, directly below the figure of the Gemini, in which Saturn is found.

Gemini and Canis Major make up part of a group of constellations which

contain more bright stars than any other part of the sky of equal area. Orion, the warrior, is the most conspicuous of these, with first magnitude Betelgeuse and Rigel, between which are the three stars in a row that form Orion's belt. High in the southwest, the other side of Orion from Sirius, is Taurus, the bull, with first magnitude Aldebaran. Above and to the left of Canis Major is Canis Minor, the lesser dog, with Procyon. In Gemini is Pollux, another of the first magnitude, and directly overhead, in Auriga, the charioteer, is Capella, which also belongs to this class. And off to the east, directly above the group of Virgo in which Jupiter stands is Leo the lion with the bright star Regulus.

It is not unusual for Venus to appear brilliantly in the evening sky the way it does at present. Once in a period of a year and seven months it reaches such a position but when it gets so bright it is always a bit surprising to those not used to it. Indeed people sometimes find it hard to believe that it is really a celestial body. In eastern New York state, for example, when it became so brilliant, the report used to go around that it was the "Edison star," an artificial light that Thomas Edison hung over Schenectady!

Venus is now so bright that it can be seen in the daytime. On Feb. 15, for a person on the central meridian of his time belt, the planet is directly south at 4:02 p.m., war time. Then it is about half way from the horizon to the zenith

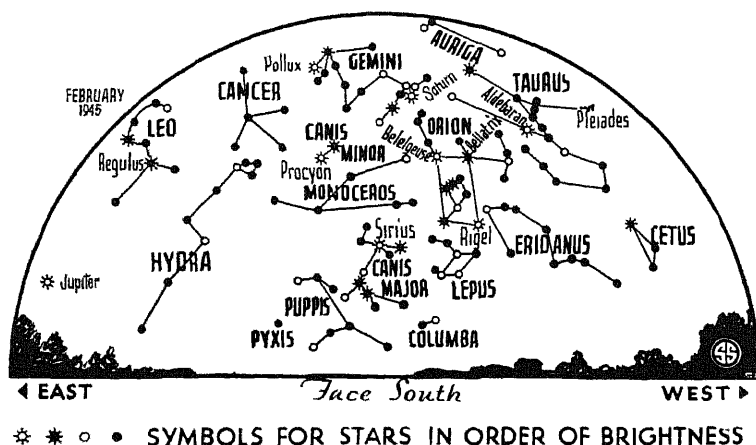
and should be located without great difficulty, if one is shielded from the direct glare of the sun. For points east of the central meridian, it will be south a little earlier, and for more westerly points a little later.

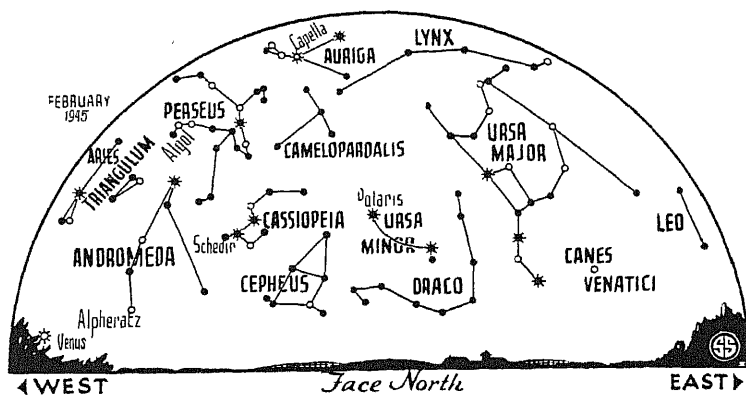
During the first part of the month, before the light of the moon interferes, one can even see shadows cast by Venus. This will be particularly noticeable out of doors, away from street lights, and where there is clean snow on the ground.

Through a telescope Venus is most interesting. At the beginning of this month it has the shape of a half moon, that is, it appears as a semicircle of light. But after this it becomes a crescent which gradually narrows. These changing phases of Venus are similar to those of the moon, and are caused in the same way. A few months ago, when Venus was well on the opposite side of the sun from us, its entire sunlit half was presented to our view and we saw a complete circle. Now the line from the planet to us is at right angles to that from Venus to the sun, which means that half the sunlit hemisphere is turned away from us, or that the half which is toward the earth is only partially illuminated. Consequently we see a semicircle of light.

Becomes a Crescent

As Venus comes more and more between the sun and earth, we see still less of the illuminated side, and it becomes a crescent. There is, of course, one important difference between the phases of Venus and of the moon. The latter remains at approximately the same distance, no matter whether full or new. Venus, on the other hand, is much closer





when it is a crescent, and hence appears larger. Also, on account of its approach to us, it continues to become brighter, until the crescent becomes extremely narrow. On the tenth of March it will reach maximum brightness, but then will be only about a third brighter than it is now.

Celestial Time Table for February

Feb.	EWI	
2	Noon	Moon farthest, 251,700 miles
	6.00 p.m.	Venus farthest east of sun

5	5:55 a.m.	Moon in last quarter
10	5:38 p.m.	Moon passes Mars
12	1:33 p.m.	New moon
13	4:48 a.m.	Algol at minimum
14	8:00 a.m.	Moon nearest, 224,700 miles
15	4:07 p.m.	Moon passes Venus
16	1:38 a.m.	Algol at minimum
18	10:27 p.m.	Algol at minimum
19	4:38 a.m.	Moon in first quarter
21	5:03 p.m.	Moon passes Saturn
	7:16 p.m.	Algol at minimum
24	4:06 p.m.	Algol at minimum
26	8:07 p.m.	Full moon
28	1:43 a.m.	Moon passes Jupiter

Subtract one hour for CWT, two hours for MWT, and three for PWT.

Science News Letter, January 27, 1945

MEDICINE

Sleeping Sickness Weapon

A new chemical for treatment of the African disease may be able to cure patients in the early stages in less than two weeks.

➤ A NEW CHEMICAL weapon against African sleeping sickness is announced by Dr. Harry Eagle, of the U. S. Public Health Service and Johns Hopkins University (*Science*, Jan. 19).

The chemical is gamma-(p-arsenosphenyl)-butyric acid. Large-scale field trials, planned to include over 1,000 patients, were started last summer with the collaboration of the Sleeping Sickness Services of the Gold Coast, Nigeria, the Belgian Congo and the British Forces in West Africa.

Results of treatment of more than 200 patients so far show that with this drug it may be possible to cure patients in the early stages of the disease in less than two weeks. Treatment with other drugs may have to continue for as long as 12 or 15 weeks, according to some published reports. Results with the new drug in treatment of late stages of the disease are not encouraging, however.

The new drug is given by injection into a vein. In the field trials it was given twice weekly, three times weekly and daily, the variation being planned

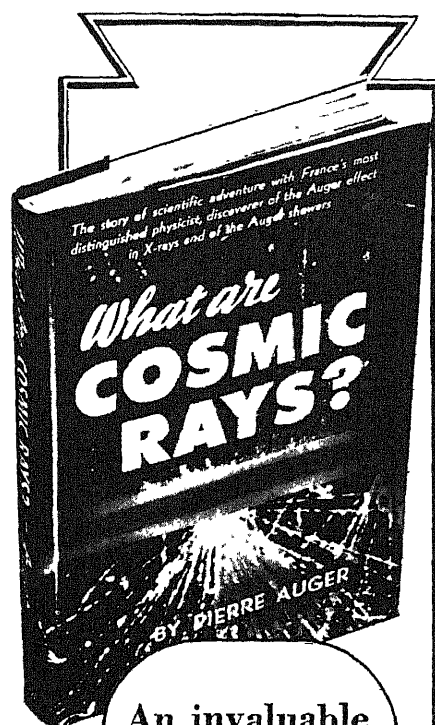
to determine the best schedule. More than 800 injections of it were given to over 100 patients, with no toxic reactions except for occasional nausea and vomiting after about 2% of the injections.

The drug seems to be active against strains of trypanosomes, the germs of African sleeping sickness, which are resistant to the widely used sleeping sickness remedy, tryparsamide, and other arsenicals. It may be effective against some, though not all, forms of the disease in animals.

Mass treatment of this widespread scourge of tropical Africa may be greatly simplified, Dr. Eagle suggests, and considerable time and money saved by this new drug.

Science News Letter, January 27, 1945

Baby minks, which finally produce fur for ladies' coats, weigh only about one-eighth of an ounce at birth; in six weeks they are the size of red squirrels and at six months of age are some 20 inches long.



An invaluable
addition to
the literature
of physics

BY PIERRE AUGER

A comprehensive, authoritative, and accurate explanation of one of the most important discoveries of modern physics.

France's most distinguished physicist, discoverer of the Auger effect in X-rays and of the Auger showers, traces the story of cosmic rays from their discovery to the most recent experiments in the field . . . A story of adventurous research, in the laboratory and at the ends of the earth, that has opened new worlds to the mind and skills of man.

ARTHUR H. COMPTON (Winner of the Nobel Prize for Physics, 1927): "Distinctly the best book that has yet appeared for . . . the educated scientific public without technical knowledge of physics, and physicists who want to get a quick view of what has been done in the new field of specialization."



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Do You Know?

Wheat sirup may soon join corn, maple and other table sirups.

Peanut oil can be used to lubricate both watches and tractors.

Iodine is a necessary element in the nutrition of man and of livestock.

Silicates in laundry soaps are in common use and some soaps contain as much as from 10% to 30% of these chemicals.

Chicks hatched in the United States during 1943 totaled approximately 1,600,000,000; this is about a dozen chicks for every man, woman and child.

Birds will not dig up and eat newly sowed seed if it has been treated before planting with an unpalatable compound in the anthraquinone series.

Recent progress in *fertilizer* research has introduced new materials, new methods of application, and new practices in soil treatment that have greatly increased production.

Peanut hulls, formerly wasted, are now ground and used as a substitute for cork in crown bottle caps; the fine hull flour formed in the grinding is used in making plastics.

Grebes, those interesting diving birds, carry on a spectacular courtship during which, for several seconds at a time, they tread water in such a way as to appear to be actually sitting on top of it.

Zoysia, as a type of grass for surfacing airports, is said to be so rugged that it resists most major plant diseases and will not tear under the impact of skidding automobiles.

PSYCHOLOGY

Waiting for Robombs

➤ BEADS OF PERSPIRATION on the forehead.

Whiteness of the face.

Aimless movements of arms and legs.

Stary eyes and tremors of arms and legs.

That's how people act when the robombs are about to fall. A mental hygiene specialist, Sgt. Adolf Woltman, of the U. S. Army, writing about U. S. soldiers' experiences in England, gives you an idea just how folks back home might act if and when the Nazis sneak a few bombs over here.

You will be scared during the "cringing seconds" between stopping of the motor and the explosion. Everyone is, Sgt. Woltman tells us (*American Journal of Orthopsychiatry*, January). But different people show it in different ways.

"No one made fun of the divergent behavior of the next person. We admitted to each other that we were afraid," Sgt. Woltman reports.

"The whole body seemed to become tense, ready to run or to jump. Palpitation of the heart became more noticeable near the wrists and the temples. Beads of perspiration formed around the forehead, and I learned to understand fully the meaning of the Army saying: 'Sweat it out.' The whole body felt keyed up. In sharp contrast to these suppressed tensions of energy there seemed to be a simultaneous calmness, a waiting for something to happen, and a knowledge that energy for action had to be preserved till needed. Breathing would increase and become deep and heavy."

Although the natural thing to do when you are frightened is to run, if you are under robomb attack there is no place to go that is any safer than the one you are in. So the thing you have to learn to do is to stay quiet. The strain of con-

trolling this impulse to run makes you tired and aching.

The favorite time for bomb attacks, Sgt. Woltman observed, was during meal time. It was necessary to learn to eat anyway and not go scared and hungry.

It was more difficult to learn to go to sleep at night.

"To stay quietly in bed and listen to the 2,000 pounds of high explosives sail overhead was an unpleasant endurance test," Sgt. Woltman comments.

Despite the strain, Sgt. Woltman saw only one man break under it. He was a soldier who would not admit that he was afraid.

The noise of a robomb is easily mistaken for other common sounds such as a passing truck, an airplane, an electric fan—sounds which you are in the habit of ignoring ordinarily. The men circulated "famous last words" such as "That's only a truck," or "That's one of our airplanes."

"I also remember," Sgt. Woltman said, "waking up in the night on several occasions listening to approaching 'buzz-bombs' which never seemed to come nearer, until minutes later I would discover someone in the room snoring on the same wave-length as the propulsion motor."

After the attacks were over, it was necessary to learn to adjust to normal conditions again, surprisingly enough. It was necessary to learn how to disregard noise again and to relax in bed and walk freely on the street.

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ENGINEERING

Simple Method for Making Thermoplastic Domes

➤ AN INVENTION of interest to the aircraft industry is covered by patent 2,367,642, issued to Edward L. Helwig of Bristol, Pa. It consists in a simple method for making structural domes out of transparent thermoplastic sheeting. The plastic material, heated to softness, is stretched across the top of a suitably deep drum and gasketed down at the edges. Air is pumped out of the drum, whereupon the outside air, under ordinary atmospheric pressure, bends the sheet inward to the desired curvature. Or, air under pressure may be pumped into the drum, blowing the dome into shape like a huge soap-bubble.

Science News Letter, January 27, 1945

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SCIENCE NEWS



South for Evergreens

➤ EVERGREENS, to most people, mean needle-leaved, cone-fruited trees that grow in northern lands. So general is this concept that when Kipling wrote of "dominion over palm and pine," the phrase was taken as an obvious though striking metaphor picturing the tropics-to-polar sweep of the British Empire.

However, had Kipling taken the trouble to look about the tropical parts of the Empire a bit, he would have found plenty of pines growing in them. To take a nearby example: if you were suddenly set down on the coastal plain of British Honduras and asked to guess where you were, you might well answer Florida or Georgia. For large parts of that definitely tropic land are dominated by a close approximation of the same pine forest that we have on our own Gulf coast.

Popular impression is mistaken not only about the geographic distribution of the needle-leaved evergreens, but also in the meaning of the word evergreen itself. It is true that pine and spruce and fir and cedar are evergreens, but they are not

the only evergreens. Any tree or shrub, or even herb, that holds onto its green leaves, or at least a good part of them, throughout the year is an evergreen. Thus, the bearberry and club-mosses that carpet the soil under the pines in the North are evergreens as much as are the trees themselves. So are such non-woody plants as Christmas fern, polypody and hepatica.

In regions where winters are relatively mild, there are many evergreen trees and shrubs that are not needle-leaved conifers.

Ready examples can be found in our own South: magnolias of several species, liveoaks, holly, rhododendron, mountain laurel, leucothoe, jasmine, cabbrier—the list might be extended almost indefinitely. And of course the palms themselves are evergreens par excellence: very few plants hang onto their leaves so persistently. In fact, it might fairly be said that the nearer you get to the equator the more kinds of evergreens you will find.

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MEDICINE

Warning for Allergists

➤ WHEN THE PATIENT says the spell of extremely cold weather has caused him to have an attack of asthma, he is right but so is the allergy specialist who says it is not the cold but feathers that are the cause of his asthma, as shown by scientific tests.

Feathers in such a case are the primary cause but cold weather may be a secondary or predisposing factor, Dr. Samuel M. Feinberg, of Chicago, explained in a report at the Seventh Annual Forum on Allergy, held in Pittsburgh.

The secondary factors which may aggravate or bring on allergic symptoms "are usually given too much importance by the public and general medical profession and too little importance by allergists," Dr. Feinberg declared.

"Their proper role should be appreciated because frequently the specific cause of the allergy cannot be found and then only the secondary cause can be managed," he said. "Even when the primary cause is known, benefit can be derived from the attention given to the predisposing causes."

Some of the common secondary factors, he said, are chemical, mechanical, thermal, nervous and mental, weather and climate and infections.

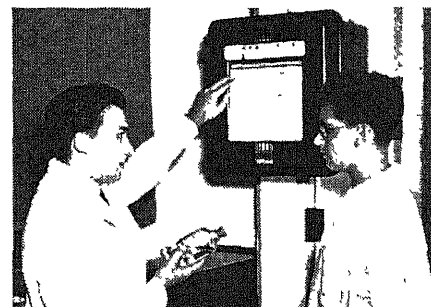
A common cold, for example, will make the allergic nose more troublesome. So will the mechanical action of chalk dust which school teachers with nasal allergy usually think is the cause of their allergy.

Inhaling soft coal smoke, gasoline fumes, paint odors and the like may be a chemical factor that brings on an attack of asthma though the primary cause is a food or pollen.

Emotional upsets, excitement, worry and similar nervous disturbances may

precipitate or aggravate allergic symptoms, though in Dr. Feinberg's opinion it is doubtful whether such nervous factors by themselves are able to cause diseases such as asthma, hives or eczema.

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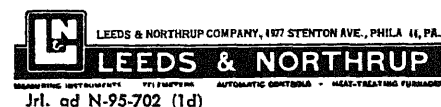


PLASMA INDUCTION HELPED BY MICROMAX

The extremely high purity which Sharp & Dohme, Inc. maintain in the water they distill for blood-plasma is, of course, guarded in several ways; and among the most effective is the measurement of electrolytic resistance of the stream as it issues from the automatic stills of the S&D plant in Philadelphia. Even the best still can be operated in such a way as to let impurities pass, but impurity lowers the water's resistance and can be the basis for extremely prompt corrective action.

The protective equipment consists of a Micromax Conductivity Recorder, connected to a cell in the effluent stream and to a signal-light and alarm buzzer. The Micromax operates continuously; when resistance reaches a predetermined danger point, it calls the operator and he merely diverts the effluent until resistance rises.

For further information, see Catalog EN-05.



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ENGINEERING

Better Postwar Cars

May be vastly improved and have longer life as a result of faults brought to light by long-time ownership of cars during the war.

➤ YOUR POSTWAR car may be much better and have longer life as a result of information the automotive industry is getting from the faults brought to light by long-time ownership of cars in the war years, John Oswald, of the General Motors Corporation, told the meeting of the Society of Automotive Engineers, held in Detroit. Manufacturers are interested more than ever before in the difficulties of long-time ownership, in some cases already totaling six years of operating the same car, he pointed out.

The majority of the faults present in the cars being driven on the roads today are quite common to a percentage of all makes of cars and are disclosed by long-time ownership, he remarked.

Thousands of car owners who don't have a garage have experienced difficulty in locking their cars when tumblers in the lock stick, and when the mechanism that opens and closes the windows fails to function, Mr. Oswald pointed out.

This is only a minor problem, he stated, compared to the starting and ignition systems with a distributor cap that has collected a lot of dust, spark plug wires

slightly deteriorated, the starter a little worn, battery efficiency reduced, and a little precipitation during the night—all of which adds up to difficulty in starting the engine in the morning.

One of the major reasons for the apparent weakness of the electrical system on today's automobile is the limited capacity of the battery and the length of time it takes the generator to replace the electrical energy that can be consumed so quickly, Mr. Oswald declared. Part of the high current consumption is due to electrically-operated accessories. The speaker suggested that all car manufacturers step up the capacities of their automobile electrical systems for the benefit of both short- and long-time owners.

Keeping down wear on front tires has become a major problem on many cars, he stated. Maintaining correct tire pressure has been the easiest of the tire conservation efforts, and correct wheel alignment the most difficult. The necessity of maintaining the original geometry of front suspension systems to minimize tire wear was almost unknown to many who now have become long-time car owners

and find alignment correction to be rather expensive. Mr. Oswald recommended that front-end suspension systems should receive more attention from engineers and that the cost of replacing worn parts and alignment procedure time be reduced.

More miles per gallon may become an important consideration after the war as a result of limited-speed driving and fuel rationing during the war years. Therefore, Mr. Oswald points out, automobile manufacturers should be prepared to give postwar buyers the facts about aviation or high-octane gasoline that gasoline manufacturers are promising will give a potential increase in miles per gallon.

Few long-time owners register complaints on engine performance and engine life, he stated. The difficulty of excessive oil consumption has continued to be one of the few items of concern on high mileage cars but it has improved.

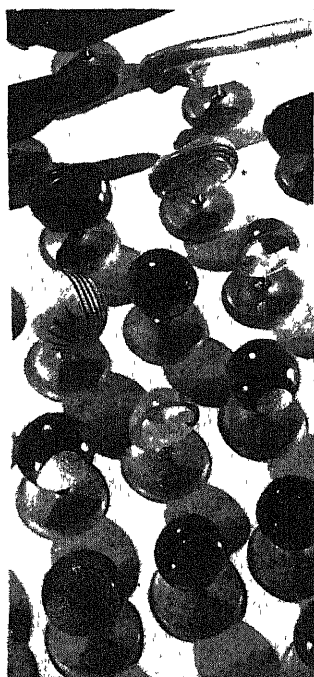
Corrosion, the rusting away of body and interior parts, is due largely to inadequate water drainage and insufficient ventilation, reports Mr. Oswald. Car manufacturers plugged all the holes and sealed all the joints to keep dust out of the car and they did such a good job that moisture which collects is retained long enough to increase corrosion. Present owners may be quite perturbed when they find out how much the rusted-away bodies will subtract from trade-in values when new cars are again offered for sale. Mr. Oswald pointed out that some corrosion problems may be solved by new designs eliminating some of the joints, better protective coatings, and improved ventilation and drainage. However, any additional cost for improvement will be reflected in the selling price of the car.

Long-time ownership has made the driving public more conscious of the quality of exterior finishes and chrome plate. After owning the same car for several years, many buyers of conservative cars have had an advantage over those who were attracted by pastel hues. Some of the latter may think a long time before purchasing another car for its color value, Mr. Oswald predicted.

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Commercial fur farming has greatly decreased during the war because of the difficulty of getting the meats, cereals and vegetables on which foxes, minks and other fur-bearing animals are raised.

Slender fluorescent lighting tubes up to 96 inches in length have been developed and will be available after the war; they are of the high-efficiency hot cathode type.



Mueller-Ward Models

**ARE ORIGINAL AUTHORITATIVE
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Models constructed by Dr. Justus F. Mueller of Syracuse University have been acclaimed as most beautiful, accurate, explicit teaching aids. An ever-growing series of models for zoological and parasitological study is being made available. Designed by Dr. Mueller, they are produced by the skilled craftsmen and artists of Ward's model department. A new Ward's catalog describes 83 Mueller-Ward models; a copy should be in the hands of every zoology instructor and general science department. Ask for catalog N-445.

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PUBLIC HEALTH

**Surgical Care for
52 Cents Per Month**

➤ AT A COST of 52 cents a month for one person, working men and women of New York City with incomes up to \$1,800 can get pre-paid surgical care in hospitals through United Medical Service, the "doctors' plan" launched by the Coordinating Council of the five New York County Medical Societies.

Complete payment of physicians' and surgeons' fees for surgical operations, the treatment of fractures (broken bones) and dislocations, and maternity care including pre-natal and post-natal care is assured under this plan. The cost to husband and wife is \$1.12 per month and for a family \$2. This is for families with incomes up to \$2,500 a year. Those with higher incomes may subscribe but the physician treating them may bill them for more than he receives from United Medical Service.

A more comprehensive service to cover medical needs and to include subscribers with higher incomes is planned for the future if growth of enrollment, financial surplus and experience with the present project make such expansion possible.

United Medical Service already has accumulated a surplus fund of \$150,000 through the operations of one of its predecessor organizations, Community Medical Care, Rowland H. George, president, stated. No further contributions are needed to launch the project for pre-paid surgical and obstetrical care.

Dr Nathan B. Van Etten, past president of the American Medical Association, is chairman of the board.

Subscribers will have free choice of physicians. Participating physicians will be paid specified fees based on rates similar to workmen's compensation schedules. Non-participating physicians will be paid up to 75% of the specified fees. Physicians' bills in excess of the fees to persons with incomes of \$2,500 to \$3,500 may be submitted to a physicians' review committee for reconsideration.

The Associated Hospital Service of New York is acting as sales organization for UMS. Membership in UMS at this time will be limited to employed groups of 50 or more which are enrolled through payroll deduction in the Blue Cross hospitalization plan. To be eligible these groups must comprise at least 75% of the total number of employees in an organization. An exception will be made for groups of 25 or more provided the employer pays the enrollment fees.

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Books of the Week

THE AERONAUTICAL DICTIONARY—Thomas A. Dickinson—*Crowell*, 484 p, illus., \$2.75.

THE ARC SPECTRUM OF IRON (Fe 1)—*Am. Philosophical Soc.*, 207 p, paper, \$2.25, (Trans of the Society, New Series, vol. XXXIV, part II).

ARCHAEOLOGICAL INVESTIGATIONS IN EL SALVADOR—John M. Longyear, III—*Peabody Museum*, 90 p., paper, illus., \$3.75, (Memoirs of the Peabody Museum of Archaeology and Ethnology, Harvard Univ., vol. IX, no 2).

CLIMATOLOGY—Bernhard Haurwitz and James M. Austin—*McGraw*, 410 p, illus., \$4.50

FUNDAMENTAL PRINCIPLES AND PROCESSES OF PHARMACY—Henry M. Burlage and others—*McGraw*, 615 p, illus., \$4.50

AN INTRODUCTION TO THE ARCHAEOLOGY OF CUZCO—John H. Rowe—*Peabody*

Museum, 63 p, paper, illus., \$2.50.

THE PHYSICS OF FLIGHT—Alfred Landé—*Reinhold*, 122 p, illus., \$2.50

PIONEERING THE HELICOPTER—Charles Lester Morris—*McGraw*, 161 p., illus., \$2.75.

PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY—*Am. Philosophical Soc.*, 536 p, paper, illus., \$1.25, (vol. 88, no 6).

PRODUCTION ENGINEERING IN THE AIRCRAFT INDUSTRY—A. B. Berghell—*McGraw*, 307 p, illus., \$3.

VIBRATION ANALYSIS—N. O. Myklestad—*McGraw*, 303 p, illus., \$3.50

VITALIZED FUNDAMENTALS OF MACHINES—Robert H. Carleton—*College Entrance Bk. Co.*, 186 p, paper, illus., 60c.

VITALIZED PHYSICS IN GRAPHICOLOR—Robert H. Carleton—*College Entrance Bk. Co.*, 378 p, paper, illus., 80c

Science News Letter, January 27, 1945

THE CHEMICAL ELEMENTS

Compiled by
PHILIP B. CHEN, Ph. D.
PROFESSOR OF CHEMISTRY, ATLANTIC UNION COLLEGE

WALL CHART

(Actual Size 38 x 50 inches)

**CONTAINS THE FOLLOWING
UNBELIEVABLY VAST AMOUNT OF INFORMATION
CONCERNING EACH ELEMENT**

Periodic table (based on atomic numbers)

Periodic table (based on atomic weights)

Name in English, German, and French

Derivation

Discovery

Symbol and atomic number

Arrangement of electrons in orbits

Atomic weight

Logarithm of atomic weight

Isotopes and valence

Crystalline form and color

Specific gravity or density

Melting and boiling points

Specific heat

Heats of vaporization and fusion

Electrical conductivity

Coefficient of thermal expansion

Occurrence, preparation, and use

The radioactive elements

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Distribution in earth crust, in ocean, in atmosphere, and in human body

Mechanical properties of principal metals

Map showing production in U.S.A.

Alchemical symbols

Critical constants for gaseous elements

Flame and borax bead tests

Index to the elements

The chart is so self explanatory that a key which is usually necessary for other charts, is not necessary for its intelligent use. Numerical values are given for constants that are represented in other charts by signs and varying length of lines or columns.

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⚙️ **FLAK SHAWLS**, blankets, and curtains are being perfected by the Army Airforce Materiel Command to protect fighter and bomber crews. The shawl, a sort of horse collar with special tail pieces, interferes less with body movements than bulky armor.

Science News Letter, January 27, 1945

⚙️ **TRI-ALLOY BEARINGS** for automobile engines and other parts, developed to replace prewar cadmium bearings, are made of 35% to 40% lead, 4.5% to 5% silver, 0.5% iron, and the balance copper. Tests indicate the so-called tri-alloy bearings to be highly satisfactory.

Science News Letter, January 27, 1945

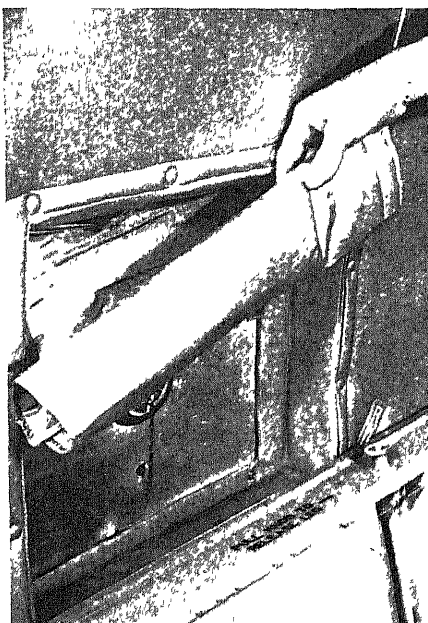
⚙️ **SLIDERULE** with decimal-point locator makes it possible for a person with limited mathematical background to solve and place the decimal point up to 19 places in difficult problems. Its simple, positive, mechanical method of placing the decimal point eliminates one of the biggest blocks in using a sliderule.

Science News Letter, January 27, 1945

⚙️ **CIRCULAR POWER SAW** for felling trees, improved design, runs parallel to the ground at the end of an arm projecting from a two-wheel mount guided by plow handles. The mount carries a six-horse-power air-cooled gasoline engine belted to the saw axis. A 24-inch hardwood tree can be felled in three minutes.

Science News Letter, January 27, 1945

⚙️ **GLASS-LINED BLANKETS**, a half-inch thick, are used to insulate Army planes and will probably be used in commercial planes after the war. The photo shows the installation of this material, made up of tiny glass fibers mount-



ed on a durable trim cloth, around a window and the protective curtain being rolled.

Science News Letter, January 27, 1945

⚙️ **HYDRO-BORING** machine, especially adapted for the boring of connecting rods, piston bushings, knuckle-pin holes and other boring jobs on aircraft engines, has a boring bar hydraulically operated, thus eliminating vibration. Boring heads on this precision apparatus have direct micrometer readings.

Science News Letter, January 27, 1945

⚙️ **MULTI-WEAVING** is a term applied to a new process in which metals, plastics, woods, rubber, and certain fabrics, may be combined into a composite

material for floor covering, ventilating and other grilles, lawn furniture and other uses. The narrow stripping is woven into many designs.

Science News Letter, January 27, 1945

⚙️ **BOAT PORTAGE** is made easy by means of a wheel attached above the bow, and slots to hold the paddles or oars in a projecting position from the stern on opposite sides so that they may be used as wheelbarrow handles. During portage the boat is upside-down, one end resting on the wheel and the other carried by the handles

Science News Letter, January 27, 1945

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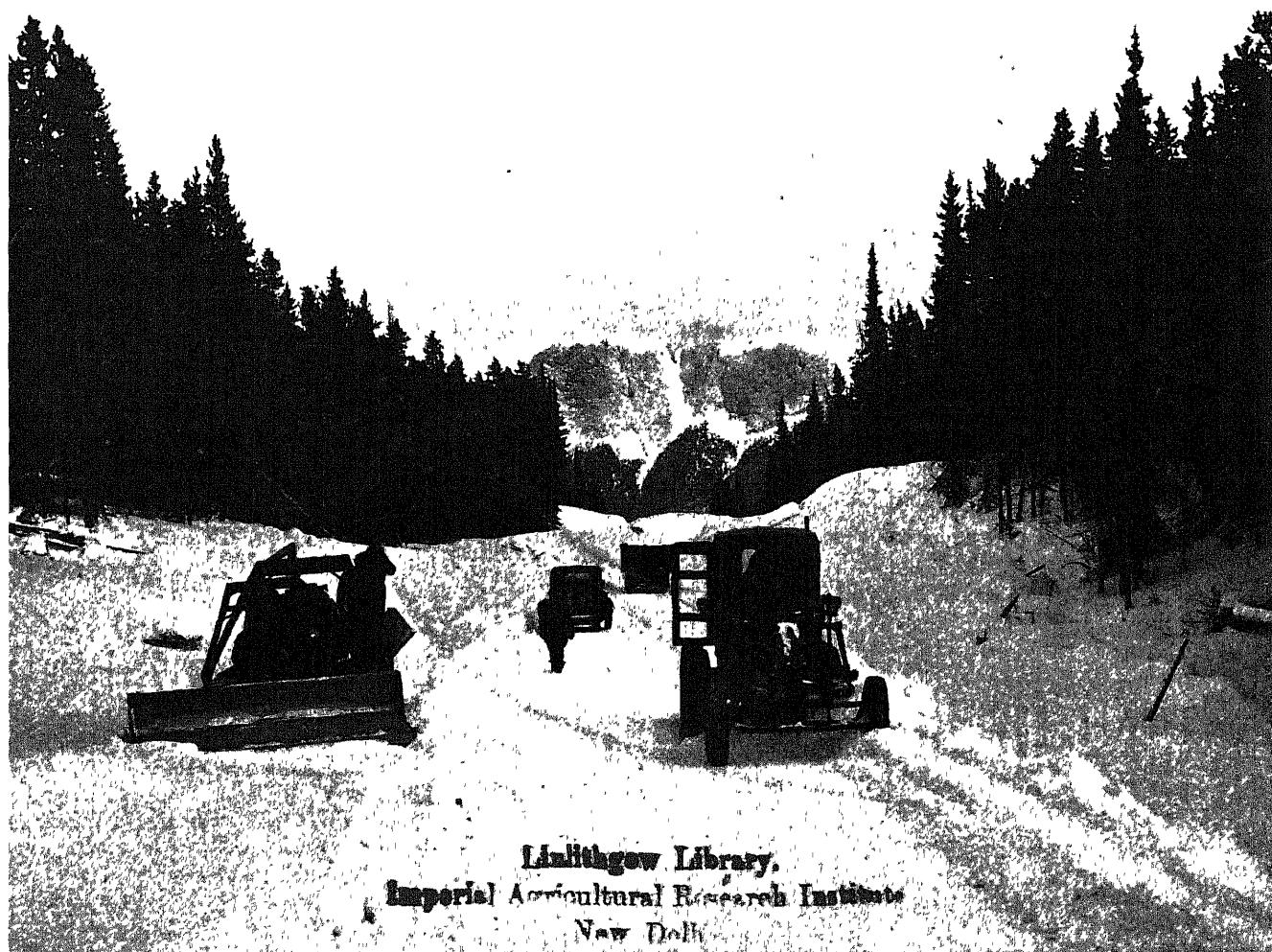
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THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 10, 1945



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A SCIENCE SERVICE PUBLICATION

DENTISTRY

High Altitude Toothache

Is caused by a disturbance of circulation in the pulp of the tooth; root canal treatment or extraction only two advisable remedies.

➤ THE CAUSE of toothache at high altitudes, which impairs the flying efficiency of almost two out of every 100 cadets and officers given altitude training, is a disturbance of circulation in the pulp of the tooth which prevents equalization of pressures during change in altitude.

Studies showing this are reported by Dr. Balint Orban, of the Chicago College of Dental Surgery, Loyola University, and Capt. Beryl T. Ritchey, AAF, assistant to the Dental Surgeon (*Journal, American Dental Association*, Feb. 1).

Their studies were made on 250 young men referred to the dental clinic from an altitude training unit and on 75 teeth extracted and examined microscopically. The men were sent to the clinic because of toothache during simulated high altitude conditions in the decompression chamber.

Of the 75 teeth, 16 had swollen pulps, 17 had acute inflammation of the pulp, 15 chronic inflammation of the pulp and seven were teeth with dead pulps. The pulp is the soft tissue inside a tooth which contains the nerves and blood vessels.

Teeth with normal pulps, the dentists state, will not hurt under decompression during ascent to high altitudes. This is true, they found, whether the teeth are intact, carious (decayed) or filled.

High altitude toothache in teeth with pulp that is still living comes almost invariably during ascent. On the average, the pain starts at 11,000 feet if the tooth has edema (swelling) of the pulp; at 7,000 feet if there is acute inflammation; and at 17,000 feet if there is chronic inflammation.

Teeth with nonvital, or dead, pulps hurt only exceptionally and in such cases usually during descent.

Sudden sharp pain at relatively low altitudes is a sign of bubble formation in the pathologically changed pulp.

Only two methods of treatment for high altitude toothache seem advisable, once the diagnosis has been established, the dentists find. These are root canal treatment or extraction. As an emergency measure, treatment with zinc oxide and eugenol may be given. This will prevent toothache during ascent, but for flying personnel it is advisable only as an emergency measure because it does not remove the source of the toothache, which may return at a later and dangerous time.

For prevention, the dentists recommend careful cavity preparation with the use of cavity varnish in every cavity and, in deep cavities, the addition of an oxyphosphate cement base under amalgam fillings.

Science News Letter, February 10, 1945

said, "one one-hundred-trillionth (1/100,000,000,000,000) of the electric energy in the light from an average home reading lamp, actually is less than the minute electric current in the dimmest starlight."

When astronomers seek information concerning changes in a planet's direction, speed or other characteristics, he explained, they hitch the tube, which is attached to a photoelectric cell, to the "eye" end of an observatory telescope. On the basis of the starlight readings, the distance between the earth and the stars is determined by trigonometric computation.

The sensitivity of the tube, which must be operated in total darkness to keep ordinary daylight from energizing the grid, is derived from its unorthodox design and construction, he continued. Glass "pants-legs" are tailored around the stiff metal wires which support the tube's internal structure to prevent stray electrons from getting lost. Functioning like a lightning rod, a tiny tungsten wire is spot-welded inside the tube and pressed against the tube's side to catch unwanted electric charges that might affect its accuracy.

A simple electronic tube contains a wire filament that shakes loose electrons when heated, a metallic mesh called a grid that acts as a control gate through which electrons must pass, and a plate that collects the electrons. In the new starlight tube the roles of the plate and the grid are interchanged; the grid functions as the plate and the plate as the grid.

Science News Letter, February 10, 1945

ORDNANCE

Rubber Instead of Springs In Artillery Shell Fuzes

➤ SIMPLIFICATION of artillery shell fuzes is the objective of the invention protected by patent 2,367,246, granted to W. E. Thibodeau of Cleveland and G. J. Kessenich of Madison, Wis. In most such fuzes, the striker is prevented from coming into contact with the primer charge until after firing by a mechanical barrier held in place by springs. When the shell is spun by the gun's rifling, centrifugal action forces the springs back and permits the arming of the fuze. The present invention substitutes a collar or hollow cylinder of soft rubber for the more complicated weight-and-spring arrangement. The rubber itself is deformed by the centrifugal action, permitting the free passage of the striker.

Science News Letter, February 10, 1945

ELECTRONICS

"Starlight" Tube

New super-sensitive small electronic tube measures electricity equivalent to the light of a star many million-million miles away.

➤ A "STARLIGHT" tube, it is called, a new super-sensitive electronic tube smaller than a 25-watt incandescent light bulb, can be used to measure accurately the feeble quantity of electricity equivalent to the light of a star many million-million miles away. It has, however, very practical essential wartime uses in the electro-chemical analysis of metals such as steel, and the de-

tection of impurities in high explosive compounds.

The new tube and its development were described at the meeting in New York of the Institute of Radio Engineers by William A. Hayes of the Westinghouse Electric & Manufacturing Co., who is responsible for its present development.

"The minimum amount of electric current which the tube can measure," he

INVENTION

25 Problems Need Solution

The Navy has sent out an urgent call for solutions to such problems as dropping articles from planes without use of parachute.

➤ HAVE YOU a good method for welding thin aluminum sheet? Or a fungicide that will make tents and tarpaulins rot-proof in the humid tropics? Or some way to prevent cracks from spreading in steel structures, without having to use a lot of rivets and caulking?

If you have, the Navy wants to know about it. It has asked the National Inventors Council to issue a general call for solutions to 25 problems that stand as challenges to Yankee ingenuity. C. F. Kettering, chairman of the Council, has passed on the word to Americans at large, confident that the right answers will not be slow in coming up.

Some of the problems, though by no means easy, do not necessarily need specialized technical training for their solution, so much as native skill in devising things. Included in this class might be the call for some way of dropping things from planes without use of parachutes—possibly some inexpensive and expendable pneumatic cushioning arrangement. Another would be a simple, easily-run-up radio antenna about 300 feet high, requiring no steeple-jack work for its erection. Still another would be a non-slipping shoe sole for use on the wet deck of a sharply rolling ship.

One group of problems is as old as seafaring itself: the job of being on or in the water and still not getting wet. Modern angles of this old difficulty include waterproofing the openings through which small shafts connect the "works" within tight radio cabinets, generators, etc., with outside cranks and control knobs; waterproof jacks for microphones and headphones; a durable plastic-impregnated tent fabric, waterproof, lightweight, weighing less than six ounces per square foot.

Sailing at night has always involved the necessity for guiding and warning lights. Accordingly, the list includes a call for a simple, lightweight beach marker light; an improved drum-type lens that spreads a flat circle of light in all directions; a narrow-beam range light that will replace the present two-lamp installations.

Several of the desired inventions are

jobs for men with professional training and experience in the fields of electrical and electronic engineering. Such are a polyphase AC motor of improved torque properties; a small DC motor without commutator, slip ring or other loose, noise-making parts; a compact, rugged, expendable mechanical device to permit successive closures of up to eight electrical circuits with a time interval between closures of about 0.2 to 0.3 seconds; a precision twin-triode vacuum tube resembling the present 6SN7 type but with improvements on it.

Concern for the safety and health of Navy men, both afloat and ashore, are reflected in several of the problems. For example the Navy wants a fire-extinguishing liquid that will work as well as the now widely used carbon tetrachloride, without the latter's distressing trick of splitting into poisonous phosgene gas when it strikes hot metal. Another requirement is for a device that will take

continuous samples of the gases in enclosed spaces, such as the bilges of boats, to detect accumulations of dangerous gasoline vapor. Still another is an efficient knapsack sprayer for mosquito control work ashore.

If you have any inventions or definite ideas along these lines, or wish a list of the 25 needed inventions giving fuller details, write to the National Inventors Council, Department of Commerce, Washington 25, D. C.

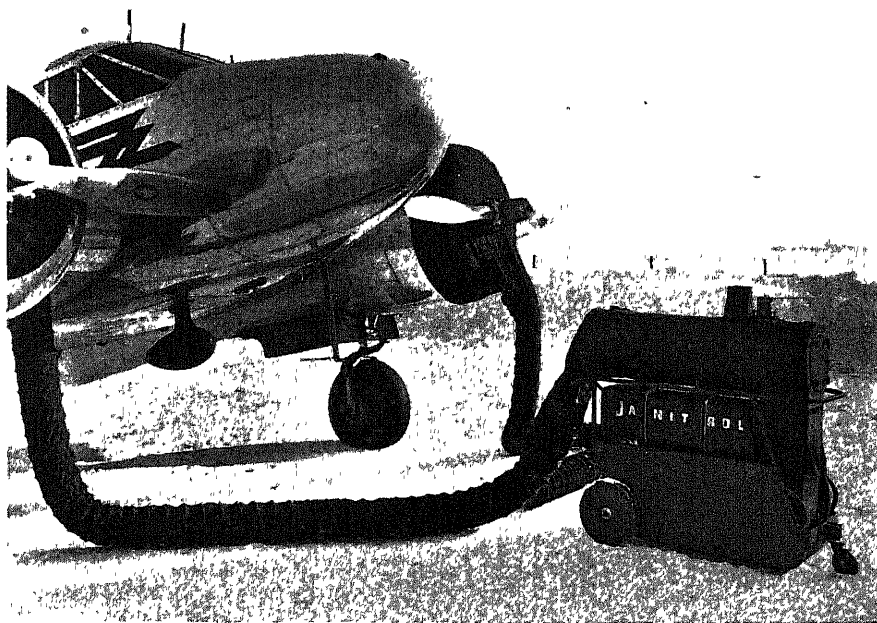
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ENGINEERING

Portable Plane Heaters Used for Many Purposes

➤ SOME COLD MORNING next winter when you find your car frozen up, you may be able to call the garage and have them bring out a portable heater to pre-heat it so you can get started. The heater they'll use will be similar to the one now being used to warm up aircraft engines in Alaska today. The need for safe pre-heating of airplane engines, cabins, instruments and windshields in climates where temperatures as low as 50 degrees below zero Fahrenheit are not uncommon was responsible for the development of a new unit that blasts out heat.

The portable heater, burning gasoline,



PORTABLE HEATER—Do you have trouble starting your car on an icy morning? A Toledo manufacturer, Surface Combustion Company, has solved the problem for airplanes with this heater which warms both engine and cabin at the same time.

kerosene or oil, employs the same "whirling flame" principle as the aircraft heater installed in most military planes using this combustion type heater. It was developed by the Surface Combustion Company in Toledo.

Frozen railroad switches, responsible for many train delays during a cold spell, could be quickly thawed out with one of the heaters which the Army Air Forces now use. Owners of truck and bus fleets will soon be able to acquire

units both to pre-heat cold equipment before starting and for use on the road to free any equipment that becomes ice or snow-bound.

Military uses other than aviation include warming hospital tents, headquarters tents and barracks. In the hot, moist tropical climates the armed-forces use the heater to dry out workshops, keeping delicate airplane instruments free of damage from moisture while they are being serviced on the ground.

Science News Letter, February 10, 1945

CHEMISTRY

New Phosphate Glass

► VOLUME production of aluminum metaphosphate planned for the postwar era will bring into commercial availability a useful glass.

From aluminum metaphosphate can be manufactured glass which transmits a substantially greater amount of ultraviolet light such as aids the formation of vitamin D.

Aluminum metaphosphate's use in the making of glass represents a radical departure from such bases as lead, well-known to the ancients, and from the more recent combination of sand, soda ash and lime. Aluminum metaphosphate is derived by Monsanto Chemical Company largely from aluminum and elemental phosphorus.

Postwar fluorescent lights may utilize phosphate glass due to its ultraviolet permeability, and it also may be found useful in windowpanes of hospitals and solariums.

Because they show less tendency to yield a haze, phosphate glasses are considered likely to solve some optical problems associated with astronomy, photography and related fields.

Phosphate glasses show improved weather resistance, improved color control, improved melting and working characteristics and improved resistance to some acids. Used in insulators, they reduce loss of electrical current as compared with other glass insulators.

A companion metaphosphate has properties that suggest its ultimate use as a heat insulator. Its volume increases 500-fold under high temperatures. Another metaphosphate, also ready for volume production, is used in ceramics.

Monsanto's Phosphate Division has produced a new white paint pigment, called tetra lead pyrophosphate, which in light-reflecting tests is superior to the usual titanium pigment. Another product

is ferric orthophosphate, which can be used in flour and cereals to give them more than twice their normal amounts of iron.

Each of these products is based on elemental phosphorus, which burns fiercely on exposure to air, and is widely used in incendiary bombs and mortar shells. Monsanto produces elemental phosphorus in a plant near Columbia, Tenn. Its current output is about ten times that of the entire nation during World War I.

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NUTRITION

Best Aid for China Is Helping Her to Produce

► THE TASK of providing food and clothing for the direct relief of China is too huge for any agency such as UNRRA or group of agencies, according to a report of the National Planning Association recently made public.

Although a stopgap will be needed for liberated areas as the Japanese are driven out, the only way to help China feed her millions is to help her restore and improve her own agricultural production.

Large quantities of agricultural equipment and supplies are needed, the report indicates. Provision of trained scientific personnel who can conduct experimental work and pass their knowledge and skills on to the Chinese will be important. Of great importance will be supplies and assistance for repairing dikes, reclaiming flooded areas and installing irrigation and flood control systems.

China also needs UNRAA's help in combatting epidemics, the report indicates, although even with this help it is not possible to achieve an "adequate" health program.

"While adequate food, clothing, shelter, and soap are the basic requirements for halting the spread of China's diseases and sickness," the report states, "the Chinese Government estimates a need for 74,000 tons of medical supplies and equipment and for the services of several hundred foreign technicians. For these purposes China has requested from UNRRA \$66,004,000 in imported supplies and services during the emergency period, while Chinese expenditures for these purposes are estimated at \$246,515,000, in Chinese currency."

Science News Letter, February 10, 1945

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TECHNOLOGY

Ample Oil Supply

Is assured by science and technology through improved production and refining processes. Coal for gasoline is plentiful.

➤ SCIENCE and technology assure an ample supply of oil for many years to come because they have made possible a greater recovery of crude oil from wells, refining increased quantities of gasoline and other derivatives from the crude, and successful methods of obtaining oil, gasoline and chemicals from coal, lignite and natural gas. This is the opinion of Robert E. Wilson, president of Pan American Petroleum and Transport Company (*Mining and Metallurgy*, January).

These important developments, he states, have come about "by improved technology resulting from research and its application to every branch of the industry. . . . This technology has not merely added to, but has, in effect, multiplied our available petroleum reserves. Today technology has made it possible to produce all essential oil products, that is, lubricating oils, gasoline, heating oils, and wax from coal at costs which are not unreasonable or out of line with values." The coal is plentiful, he says.

The amount of oil obtained from wells was for many years only what resulted from natural flow or obtained by pumping.

"Today we can flush the oil out of the sand with a water drive," he states. "As oil becomes more valuable and technology becomes more improved the percentage recovery will go up."

By water pressure from 60% to 70% of the oils in the sands are obtained; by the earlier method, with pumps alone, only about 20% was recovered.

Science and technology have made it possible to convert heavy fuel oil into gasoline and other oil products, Mr. Wilson says, and we are approaching the time when there will be a decrease of perhaps 15% in the yield of heavy fuel oil from crude because heavy fuel oil is now more valuable for making gasoline.

The United States has normally between 65% and 70% of the motor vehicles in the world, he declares, and produces and refines between 65% and 70% of the world's petroleum. We "cannot expect to produce indefinitely 65% of the world's oil," he adds, "We must

look more and more to foreign sources of oil."

"The really rich areas in oil, as proven by drilling," explains Mr. Wilson, "are in the large basins alternately lifted and depressed between major continents—the Caribbean area, including our Gulf Coast, Venezuela, and Colombia; the great area between Europe and Asia, which has the tremendous reserves of Arabia and Iran; the intercontinental area of the Netherlands Indies between the continents of Australia and Asia; and finally, the area around the Arctic Ocean, in northern Russia and around Alaska, which may prove a rich area but which, because of physical difficulties, has not as yet been explored."

The Middle East fields in Arabia, he says, are particularly rich. Test drilling "indicates that the Middle Eastern fields are incomparably richer than those in this country."

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MEDICINE

Ambassadors Helped in Fight to Check Typhus

➤ AMBASSADORS joined with scientists and Army and Navy Medical and Sanitary Corps officers in the fight against typhus fever, latest awards of the United States of America Typhus Commission Medal show.

The Honorable Alexander Comstock Kirk, U. S. Ambassador to Italy, and the Honorable Laurence A. Steinhardt, U. S. Ambassador to Turkey, are among the recipients of this award announced by the War Department. The awards were made by the War Department by the direction of the President.

Mr. Kirk, as Minister to Egypt during the period from Jan. 7, 1943, to May 1, 1944, took great personal interest in the activities of the commission. His constant support of its program "contributed materially to the success of the commission's investigations and control of typhus fever in the Middle East," his citation "for exceptionally meritorious service" states.



4 MONTHS OLD—Barbara, the first hybrid gibbon ever born in captivity, gets her pablum, milk and orange juice like any baby. She is fed with a bottle on a three-hour schedule, while her admiring public looks on. Between feedings she kicks, reaches for toys and sleeps and sucks her thumb. Barbara has been separated from her mother because the mother (who had never before had a baby) did not care for her properly. (See SNL, Oct. 14, Nov. 18).

Mr. Steinhardt, also cited for "exceptionally meritorious service," besides his active cooperation with the commission and support of its efforts to control typhus fever in Turkey, "personally made possible a cooperative project with the Turkish Army Medical Department which advanced the appreciation of American medicine in Turkey and fostered scientific understanding and good will."

The vaccine used to protect American fighting forces against typhus fever and DDT, the powerful killer of lice which spread typhus, have been justly acclaimed, especially for their roles in the control of the epidemic in Naples last year. Besides these weapons, the fight against typhus required organization and administration and laboratory studies. Meritorious service along these lines was given by others receiving the Typhus Commission Medal. They are: Capt. Thomas J. Carter, M.C., U.S.N., Chief, Preventive Medicine Division, Bureau of Medicine and Surgery, Navy Department, whose home address is 2910 North 24th St., Arlington, Va.; Col. Harry

Poltz, M.C., A.U.S., 671 East 17th St., Brooklyn, N. Y.; Lt. Col. John Crayton Snyder, M.C., A.U.S., 535 East 72nd St., New York City; Lt. Comdr. William B. McAllister, Jr., M.C., U.S.N.R., 2385 Euclid Heights Blvd., Cleveland, Ohio; Maj. Charles M. Wheeler, Sanitary Corps, A.U.S., 200 West Imperial Highway,

Brea, Calif.; Maj. Theodore E. Woodward, M.C., A.U.S., 1 Park Ave., Westminster, Md.; Lt. Comdr. Andrew Yeomans, M.C., U.S.N.R., 38 Webster Place, Brookline, Mass.; Capt. Byron L. Bennett, Sanitary Corps, A.U.S., 14 Autumn St., Boston, Mass.

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RESOURCES

More Tungsten

► **TUNGSTEN** AND molybdenum, rivals for favor in the war-essential rare-metals family, are now available in sufficient quantities to meet the most important needs, among which are the 15,000 types of items used mostly in electric lamps and electronic tubes, according to the lamp division of the Westinghouse Electric & Manufacturing Company, one of the largest American producers of pure tungsten for electrical uses from imported wolframite ore. Its production of tungsten from the imported ore is now 16 times as great as in prewar years, and the production of molybdenum, from an American ore, has increased to about the same extent.

In prewar years tungsten ore came principally from countries now wholly or partly under Japanese control. Chinese ore is reaching the United States, but it has to be brought by aircraft transport into India and shipped from there by boat. The United States is one of the principal molybdenum mining and smelting countries.

For use in electronic tubes and lamps, both tungsten and molybdenum must be in a high state of purity. The processing of both requires intricate and precise handling. The metals are reduced to powder form and later pressed into ingots strong enough to be drawn into very fine wire or to be formed into rods and sheets. Both these metals have high melting points, both have electrical conductivity about one-third that of copper, and both compare favorably with the more expensive metals, platinum and tantalum, in their ability to resist corrosion.

Tungsten is slightly superior to molybdenum in some respects, but it is limited as to size and form and weighs twice as much. It is one of the heaviest of all metals. It has the highest melting point of all. High-speed cutting tools are approximately 20% tungsten, and can be used on a lathe until red hot without losing hardness. Tungsten alloys, particularly steel alloys, are used extensively

in many types of machines and especially in war munitions.

Molybdenum is a silvery white metal with a high melting point, and is used extensively in steel alloys to increase tensile strength, as well as in electric lamps and electronic tubes. It is also used in high-speed cutting tools as a substitute for tungsten. In steel alloys it is particularly valuable in protecting against corrosion, and especially against sulfur corrosion. It is called indispensable in vacuum tubes and all other electric equipment where high conductivity, great strength and rigidity at high temperatures are required.

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CHEMISTRY

Synthetic Rubber Now Used For Ship-Bottom Paints

► **SYNTHETIC** rubber now can replace natural rubber in another field—in the production of chlorinated rubber for ship-bottom paints, anti-fouling paints, and non-inflammable paints. Chlorinated synthetic rubber can be used also in the preparation of sand-core binders for molding operations, adhesives, and other products. The new synthetic chlorinated rubber is a development of the Goodyear Tire and Rubber Company.

The chlorination of natural rubber is carried on at fairly low temperatures, the rubber being dissolved in carbon tetrachloride and chlorine gas passed through the solution. The result is the formation of a new molecule that might be called "natural rubber chloride."

The chlorination of standard GR-S rubber can be carried out only at high temperatures. Catalysts were developed to lower the temperature but difficulty was experienced in getting rid of the catalysts. Therefore it was found necessary to develop a new type of synthetic rubber for chlorination. This is the new product.

The new chlorinated synthetic rubber



ARABIAN ORYX—The first of its kind ever to be at the zoo in Washington, this oryx was presented by James M. Landis of the Foreign Economic Mission (See SNL, Dec. 16). The animal has large hoofs for walking on the sand.

is a creamy white powder containing from 60% to 70% chlorine. It is equal to the natural rubber product in every way, it is claimed. It is soluble in all aromatic hydrocarbons, including benzene and toluene, and also in esters like ethyl acetate and in chlorinated hydrocarbons. It is noninflammable, is resistant to both acids and alkalis and has excellent anti-corrosion qualities.

Science News Letter, February 10, 1945

INVENTION

New Grenade Thrower Works Like a Slingshot

► **PROBABLY** every G. I. now in combat used, as one of the earliest of his boyhood missile weapons, a rubber-band "slingshot" or catapult. He will be given a chance to use the same weapon again, on a larger scale and "for keeps," if the device on which Brooks Walker of Piedmont, Calif., has taken out patent 2,367,249 is made part of his equipment.

The invention consists of a pair of long, stout rubber bands, with stirrups to fit over the soldier's feet and a cup-like holder in the middle to take a grenade instead of the old-time pebble or marble. Lying on his back, the soldier hauls back on the holder with both hands until it is nearly up to his chin, then lets go.

Science News Letter, February 10, 1945

ASTRONOMY

Double White Dwarf

Only double star known to have white dwarfs for both of its components is probably only 1/1,600 as luminous as the sun.

➤ THE ONLY double star known to have white dwarfs for both of its components, recently discovered by Dr. W. J. Luyten of the University of Minnesota, is probably only 1/1,600 as luminous as the sun. The density of these two stars is about 25 tons per cubic inch, Dr. Luyten reports (*Science*, Jan. 26).

"This new double white dwarf seems destined to play an important role in our search for knowledge concerning the white dwarfs," states Dr. Luyten. These freak stars have a high temperature, yet are so faint, in proportion to their distances, that their diameters are thought to be about the size of one of the planets and their average density incredibly large.

The two components of LDS 275, located in the southern constellation of Antlia, nearly 50 degrees due south of the bright star Regulus in Leo, appear to be

so nearly identical in color and luminosity that it is safe to assume that their masses are also virtually equal, Dr. Luyten reports. In all other binaries involving a white dwarf the ratio of the masses must also be known since the two components are very dissimilar.

Both dwarfs are white or blue in color, and seem to have a diameter smaller than that of the earth. If they are of normal mass, about equal to that of the sun, their density would be of the order of one million times that of water, or about 25 tons per cubic inch, Dr. Luyten estimates.

The two stars appear to be about four seconds of arc apart, which means that they are probably fifty times as far apart as the sun and the earth, if his guess as to their distance is correct. It probably takes 250 years for the two to make one complete revolution in their orbit.

The existence of white dwarfs was not discovered until the beginning of the century. About 11 double stars are known to contain one white dwarf, and a total of 70 white dwarfs have now been discovered.

Science News Letter, February 10, 1945

GENERAL SCIENCE

Committee Set Up for Future Standards Work

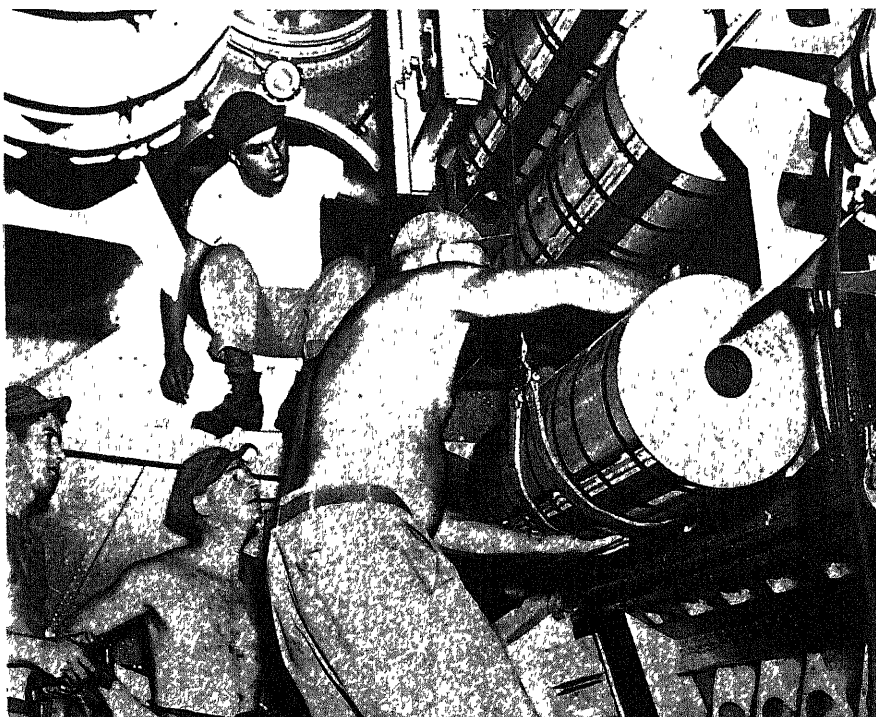
➤ FUTURE plans for standards work will be formulated with the assistance of a committee of eight industrial executives appointed by the Secretary of Commerce to make recommendations to him in regard to the relative roles that should be played by government and industry in standards activities. Charles E. Wilson, president of the General Electric Company, has been made chairman of the group.

The other members of the committee are Frederick M. Feiker, dean of engineering, George Washington University, Clarence Francis, General Foods Corporation; Ephraim Freedman, R. H. Macy and Co.; Frank B. Jewett, National Academy of Sciences; William B. Warner, McCall Corporation; Arthur D. Whiteside, Dunn and Bradstreet; and R. E. Zimmerman, U. S. Steel Corporation.

The appointment of this committee is one of the results of a conference of 50 business leaders held recently in New York at the invitation of the Secretary of Commerce at which the needs for standards and the work of the National Bureau of Standards and of the American Standards Association were discussed. The conference recommended that industry should provide a strong leadership in the development of national standards and that this should be done in full cooperation with the government.

The conference noted with approval steps already taken by the American Standards Association to broaden the scope of its work to enable it to deal with any standard or standards project that deserves national recognition, whether in the field of engineering, or consumer goods. The conference also commended the work of the National Bureau of Standards but expressed the opinion that it can increase the value of its services to industry by strengthening its work on the fundamental standards and methods of measurement, and on the development of data needed in standardization activities.

Science News Letter, February 10, 1945



TOKYO RAID—Ground crewmen hoist a 500-lb. cluster of Chemical Warfare Service M69 flaming jelly bombs into the bomb bay of a B-29 Superfort as planes of the 21st Bomber Command prepare for a raid on the Japanese capital. Official U. S. Army Air Forces photograph.

GENERAL SCIENCE

Canadian NRC Active in Scientific Research Work

► THE CANADIAN National Research Council recently issued a review of its work during the past year, in which its important war functions in the field of science are covered. The Council operates 11 research laboratories, acts as adviser to the various government departments, and organizes and coordinates wartime scientific, engineering and technological research activities in universities, colleges and industrial laboratories throughout the nation.

This third function is performed generally through 50 "Associate Research Committees, a distinctly Canadian mechanism of proven effectiveness." These committees are set up and convoked by the National Research Council but operate as associations of the leading experts in their particular research fields. They receive financial grants, lay out programs and allocate problems to laboratories.

This Canadian Council, set up over 25 years ago, has greatly expanded during the war and now directs practically all its efforts to war work. Its principal activities are in problems concerned with aeronautics, explosives, ballistics, medicine, foods, and in secret matters in which experts of the departments of national defense, munitions and supplies are collectively engaged. In addition to research problems in its own laboratories, it is supporting 162 projects in the laboratories of 29 widely distributed institutions.

Science News Letter, February 10, 1945

CHEMISTRY

Still Converts Salt Water Into Safe Drinking Water

► A NEW pocket-size solar still assures a continuous supply of fresh water to Army and Navy flyers forced down in tropical waters. The still, under average conditions in the Southwest Pacific, can convert salt water into safe drinking water at a rate of more than a pint in eight hours. Under ideal conditions it can turn out almost double that amount in the same period of time.

The basic idea for the Sunstill, manufactured by the Gallowhur Chemical Company, was conceived by Richard Delano of Locust Valley, N. Y. It actually harnesses the rays of the sun to make drinking water of sea water. The still itself consists of a vinyl plastic en-

velope folded into a pocket-size package. It is inflated like a balloon and tied alongside the lifeboat or raft, so that it floats on the water. A black cellulose sponge, stretched through the middle of the envelope, soaks up water and absorbs the heat of the sun. Then, through evaporation and distillation, the sea water is converted into safe drinking water.

There are no moving parts, and the device will work indefinitely. Until the development of the Sunstill there were only four other methods of providing survivors with the first essential to their well-being, water: equipping the craft with canned or bottled water; catching rainwater in a tarpaulin; the use of desalination briquettes; and the squeezing of water from fish. The Sunstill has high priority on the list of equipment used for air-sea rescue in the Pacific.

Science News Letter, February 10, 1945

HORTICULTURE

Leaf-Color Chart Helps To Get Redder Apples

► THE REDDER the apples the better they sell. But the right shade of green in the apple-tree's leaves is an indicator of how red the apples will be, since healthy dark-green in leaves and lively red in apple skins both result, in part, from proper adjustment in the amount of nitrogen fertilizer fed to the tree.

Working on this principle, two Cornell University faculty members, O. C. Compton and Prof. Damon Boynton, made careful laboratory studies of the color of leaves collected in midsummer from trees under different nutritional conditions. Using their spectrophotometer data a New York City research corporation made up a set of seven carefully compounded printing inks, with which a chart of seven leaf-green shades has been prepared. Now all an apple-grower needs to do is hold the chart alongside sample leaves from his trees, and he will get an idea of how things stand with their nitrogen nutrition.

In general, high nitrogen produces apples of large size but poor color; and since color is the deciding sales factor a compromise must be sought between color and size.

The work of the two Cornell researchers has thus far been confined to one apple variety, the McIntosh. However, since about half the apples raised in New York are of this variety, their studies are considered of particular importance for this state.

Science News Letter, February 10, 1945

IN SCIEN

METEOROLOGY

Clearing February Snow From the Alaska Highway

See Front Cover

► THE DEPTH of snowfall on the Alaska Highway is much less than that on main highways through the Rocky Mountains or in New York state for that matter! This OWI photograph, taken in winter, shows the section near Little Atlin Lake being cleared.

Snow is not considered a major weather hazard along the Alaska Highway. The mountain wall that separates the interior from the coast acts as a great weather barrier. On the highway side of the mountains the weather is more bitterly cold, but the volume of snowfall is correspondingly lighter.

Science News Letter, February 10, 1945

AERONAUTICS

Cargo-Carrying Plane Resembles P-38 Lightning

► PLANES THAT LOOK like the two-tailed P-38 fighters may continue to be regular visitors at American airports after the war is over, but they will come loaded with peacetime cargoes of mailbags and express packages instead of concentrated trouble for Nazis and Nips. U. S. patent 2,367,538 has been granted on a cargo-carrying adaptation of the familiar "Lightning," to George C. Sullivan of Lockheed Aircraft Corporation.

Main cargo space in the new plane is back of the pilot's compartment in the central fuselage. Trucks for loading and unloading run under the long horizontal stabilizer between the twin booms. The cargo-space door is the whole rear end of the fuselage, hinged upwardly; the floor is designed to be level with the truck bodies.

Additional stowage space is provided underneath the motors in the two nacelles; the inventor suggests these compartments as desirable for mail carriage. Still more space may be made available in the thickness of the wings; these compartments would be provided with sliding trays for quick transfer of their contents.

Science News Letter, February 10, 1945

THE FIELDS

CHEMISTRY

Melamine to Be Available In Larger Quantities

► MELAMINE, a complex chemical compound containing nitrogen, carbon and hydrogen and used widely in making certain war essential and other plastics, will be available in larger quantities in the near future with the completion of a new building now underway at the Monsanto Chemical Company plant in Everett, Mass. This company owns the basic patent on melamine formaldehyde resins.

Melamine, a century old Swiss chemical, came into commercial use in making plastics less than a decade ago, but melamine plastics have developed rapidly because of recently discovered methods of producing the source material from dicyano-diamide which, in turn, is made from calcium cyanamide. This last named chemical is made from nitrogen and calcium carbide obtainable from coke and lime.

Employed in plastics, melamine produces a material characterized by limitless color range, good resistance to high and low temperatures, superior arc resistant properties, excellent moldability and exceptional utility as a surface coating. It is now being used in ignition and electrical control systems of military aircraft. Melamine resins are used in the preparation of plywood glues and laminates.

Science News Letter, February 10, 1945

CHEMISTRY

Addition of Selenium Improves Lubricating Oil

► LUBRICATING oils are found to be improved by the addition of small amounts of compounds of selenium, a non-metallic chemical element of the sulfur-tellurium group, as a result of investigations recently completed by the Battelle Memorial Institute. The selenium compounds impart many desirable features to the oil, including the ability to resist its tendency to oxidize and form sludge and gummy resins in the engine. A film of selenium-treated oil will support increased pressure between surfaces.

Selenium is usually found associated with sulfur in metallic sulfides. Discov-

ered in 1817, it was long regarded as a waste product in the copper industry but later several important uses were found for it. Selenium colors glass a rose-red and so can neutralize the green tint of ferrous impurities. Red signal glass is made with it. Selenium insecticides are used, but they are toxic to some plants; and foods grown on soils containing selenium have toxic effects on animals.

Selenium is used also in radio and electronic equipment, the toning of photographic prints, the making of free-machining alloys, and the barnacle-proofing of ship hulls. Its beneficial use in lubricants will improve its position in the chemical world.

Science News Letter, February 10, 1945

METALLURGY

Manganese and Aluminum Bronze Distinguished

► QUICK, EASY, inexpensive and accurate is a new method, using an indicator solution recently developed, to distinguish between manganese bronze and aluminum bronze in scrap and other metal. In the past this has been largely guesswork, because of the similarity in appearance of the two alloys. The discovery was made by the U. S. Bureau of Mines at its experiment station in Pittsburgh.

To make the test, a small area of the metal is cleaned thoroughly of all dirt, scale and grease by grinding. This spot is then sprayed with a sulfuric acid solution. After the acid has had several seconds to react, a drop of the indicator solution is added. If the metal is manganese bronze a grayish-purple spot appears; but if it is aluminum bronze the spot is greenish-yellow.

The indicator solution consists of varied weights of ammonium-mercury thiocyanate, silver nitrate, and ammonium persulphate.

Science News Letter, February 10, 1945

CHEMISTRY

Quick-Killing Poison Made of Cyanide

► A QUICK-KILLING poison charge, to be fired into the snarling mouths of trapped coyotes or other predatory animals, is covered by patent 2,368,368, issued to Ethel P. Marlman of Las Animas, Colo. Potassium cyanide is mixed into a soft paste with petroleum jelly and loaded into shotgun shells. The charge is, of course, to be used at short range.

Science News Letter, February 10, 1945

ASTRONOMY

Kiev Observatory Is Now Completely Restored

► THE HUNDREDTH anniversary of Kiev Observatory can now be celebrated in the restored university buildings. The work of rebuilding the observatory—built in 1845, and thus one of the Ukraine's oldest scientific institutions—is completed.

When the astronomers returned to Kiev from Sverdlovsk, a town about 1,900 miles away where the valuable equipment had been sent for safe keeping, they found the observatory building empty, its contents having been plundered by the German occupants.

Elderly scientists aided the technical staff in repairing the buildings and erecting the instruments, so that now regular observations are being carried out and students are again being taught there.

Plans have been made to extend the observatory in the near future. Work has already begun for mounting a big modern refracting telescope. A deep basement will be built for seismic apparatus and a building will be constructed for an astrophysical laboratory.

Science News Letter, February 10, 1945

GENERAL SCIENCE

Dr. W. J. Eckert to Head IBM's Science Department

► THE DIRECTOR of the Nautical Almanac Office at the U. S. Naval Observatory, Dr. Wallace J. Eckert, has been appointed to head the department of pure science organized by the International Business Machines Corporation.

Dr. Eckert will assume his new post at the IBM World Headquarters Building in New York upon completion within a few weeks of the 1946 volumes of the *American Nautical Almanac* and the *American Air Almanac*, and of the *American Ephemeris for 1947*.

Before going to the Nautical Almanac Office, where he contributed to the development and examination of new methods of navigation, Dr. Eckert was professor of astronomy at Columbia University. Here he organized a pioneer scientific computing laboratory. His principal field is celestial mechanics and astronomy of position.

The position of director of the department of pure science was created to further the company's program to advance scientific calculation.

Science News Letter, February 10, 1945

PHYSICS

War's Infant Prodigy

Just 27 months ago, the war's first American-made battle rockets were launched; since then they have become of first-rate importance in every theater.

By HOLMAN HARVEY

➤ ONLY 27 months go, the war's first American-made battle rockets—tank-shattering bazookas—were launched against Rommel in North Africa. In that short time, the rocket has become a factor of tremendous importance in every theater of the war, and on land, at sea, and in the air. Never before in the history of warfare has any weapon forged to such universal acceptance in so short a time.

As a measure of the crucial importance which we attach to rocket warfare, the Navy has tripled its budget for rocket production for its own and the Army's use to \$100,000,000 a month for this year; while the Army has stepped up its own smaller expenditure thirteen times over last year to a total of \$13,000,000 a month. The combined U. S. rocket program, with a total of over \$1,350,000,000 earmarked for 1945, thus begins to approximate Army-Navy expenditure for heavy gun ammunition.

I have just talked with Army and Navy officers specially detailed to rocket development and research. They can't tell you much about the size, or range, or destructive power of weapons yet to come; but they will tell you that experimental models not yet perfected have been put into production and rushed overseas, and that one model is scarcely in the works before an improved one is awaiting its turn on the assembly lines.

The largest German launcher so far reported in action is a six-tube affair mounted on a two-wheeled carriage and weighing, in all, about 1200 pounds. It fires a 5.9-inch rocket.

"Secret" Weapon

One rocket used in our launchers which until recently was a closely guarded "secret weapon"—the 4.5-inch—is a far cry from the original bazooka rocket of 2.36 inches diameter. It is about twice as long as its 18-inch forebear, and, instead of a mere 3 1/3 pounds, it weighs 38 pounds. It packs the punch of a 105 millimeter howitzer shell.

A single-tube 4.5-inch outfit, mounted

on a camera-style folding tripod, has been used by our soldiers in jungle warfare. Launcher and tripod weigh only 12 pounds, which, with the weight of the rocket itself, adds up to a 50-pound load. One foot soldier can advance with this outfit, set it up, and let go. But he'd better keep well to the side when he fires, for the blinding blast of hot gases rushing from the rocket's rear vent kicks up a furious wake of dirt and rubble to a distance of 25 yards or more. The soldier actually fires from a safe distance by means of a connecting electric wire and pushbutton. The blast kicks over the tripod and often bends or destroys it, so that the launcher is considered "expensible" with one firing. Dozens or scores of these individual 4.5 launchers can be connected up and fired simultaneously.

The bazooka, with its shoulder launcher which can be fired and refired many times, and its lightweight rockets, a plentiful supply of which can be carried by one man, remains, in improved form, a standby. At 200 yards, because of its famous "hollow charge," an American invention which concentrates the blast of the explosion at a single point, it can burn its way through six inches of armor plate, filling the tank's interior with flying fragments of molten steel and flaming gases.

The Navy's island conquests in the Pacific have shown the terrific striking power of massed battle-rockets. Troops have to land on heavily fortified beaches and move inland through matted tropical growth which give the defenders the advantage of dense cover. The Navy realized that a short-range, powerful weapon was needed to fill in the critical time between the lifting of the naval gun barrage from offshore ships and the arrival of landing boats at the shore line. But landing craft were too light to support an adequate number of guns with their heavy mountings. The rocket, with its comparatively featherweight launchers and its paralyzing short-range wallop, was obviously the answer.

LCI and LCT landing boats, converted into rocket-bearers, now spear-

head our landings. As they near the shore, multiple banks of launchers send a continuous cascade of thousands of high explosive rockets crashing onto the beaches, knocking out pill boxes, barbed-wire, machine-gun nests, fortifications. Once beached, the rocket ships direct a creeping barrage inland ahead of our advancing troops, cover them as they land their equipment, emplace their guns, and dig in. Says the Navy in an official statement describing a sample attack by rocket-boats: "Each craft carried hundreds of rockets. The projectiles are divided into racks and fired in salvos." The fire power is comparable to that of a battleship. The rocket ships are so successful that the Navy is arming bigger and bigger boats with the new weapon.

Aircraft Weapon

The rocket's light weight makes it of special value, too, as an aircraft weapon. Furthermore, the rocket has little or no recoil to deflect a plane from its true-course, as would the discharge of a sizeable cannon. The Navy now has in action a new five-inch aircraft rocket with explosive power equivalent to a 155 millimeter shell.

Army fighter planes now mount a battery of six rocket launchers beneath each wing. Rockets launched from a plane in rapid flight are much more accurate than those launched from stationary positions, for the plane's speed is added to their own, and speed tends progressively to hold any moving object to its course. Aircraft rockets are now more accurate against enemy targets than an equal weight of free-falling bombs, and at ranges up to 400 yards, as accurate as aircraft machine-gun fire. But rockets, so far at least, are not replacing those weapons; they are additional equipment. As against a maximum of 12 rocket shots, a plane's machine guns deliver hundreds of rounds and are instantly reloadable. The rocket racks cannot be reloaded in flight. The wind resistance created by rockets lined up beneath the wings slows the plane and affects its maneuverability and balance. For this reason the rockets can be jettisoned by the pilot at a moment's notice.

How important the rocket eventually will become depends largely on whether it can be made to achieve better accuracy. Precision manufacture of parts has

accomplished much in that direction. The bazooka appeared with stabilizing fins. Newer rockets have folding fins which spring open after the rocket leaves its launcher. For the first time, too, rockets have been given spin by an ingenious arrangement of the tail vents. This is a pioneering effort to get the same benefit which rifling the barrel gives a shell.

The Army has developed a propelling powder which burns more uniformly, gives increased speed (which improves accuracy), and is less subject to atmospheric conditions than previous rocket fuels.

A rocket is nothing more than a cylindrical casing of metal with a pointed nose and an open vent or vents at its rear end. The head is packed with a high explosive charge, as is any artillery shell. The rear section is packed with powder. When touched off the powder burns furiously. The gases thus produced escape through the vent. What drives the rocket forward is not any push of the gases on the outside air, but the pressure the expanding gas within the cylinder exerts against the forward end of the rocket. The distinction is important. It explains why a rocket travels faster at high altitudes—the thinner atmosphere offers less resistance to the progress of the projectile. If the rocket were propelled by the push of its exhaust, it would fly more slowly in thin air, having less to push against.

The rocket is just another way of delivering an explosive charge against a target. It has vast advantages within its own sphere of action, and it has its disadvantages which, for the present, disqualify it for many uses.

The German V-2 is a rocket that derives all of its motive power from the fuel it carries, and does not depend upon the intake of outside oxygen for combustion as does the V-1, which is classed as a machine. The British Ministry of Information states that the V-2 ascends to a height of 60 land miles, attains a speed of 3000 miles an hour (several times faster than sound), and has a maximum range of 200 miles.

But the rocket men never rest. Hundreds of square miles of our Mojave Desert thunder these days to the crashing of rockets as American research sends ever newer models to these vast testing grounds. The United States is convinced that it can beat the Germans in developing these weapons. And we intend to stay out in front.

Science News Letter, February 10, 1945

(This background story on rocket development will appear in *The Reader's Digest* for March.)

INVENTION

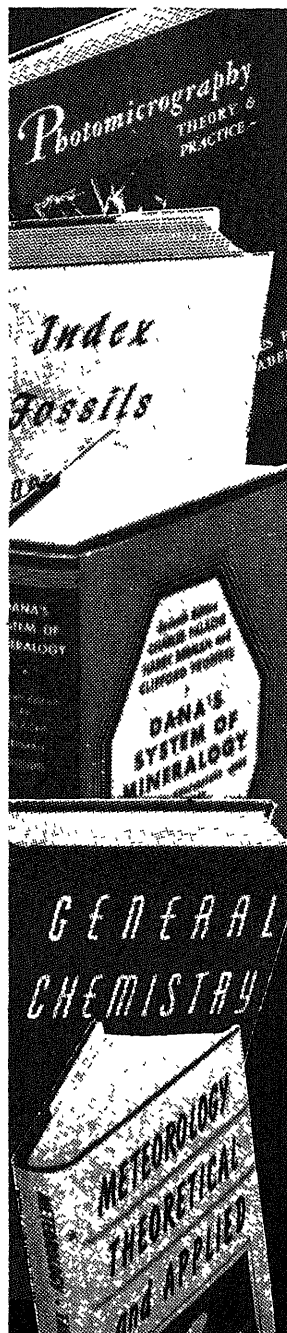
Improved Apparatus for Peeling Wheat Is Offered

➤ AN IMPROVED apparatus for peeling wheat is offered by Theodore Earle of Pacific Palisades, Calif., for patent 2,366,711. "Peeling" wheat consists in gently bruising it to remove the outermost corky layer, which has no nutritional value, leaving the beneficial parts of the bran to go through the milling

process with the rest of the grain. This was done at first by immersing wheat in water in rubber-lined flotation cells, and spinning it violently against the walls.

In Mr. Earle's new process, complete wetting of the grain is avoided. Instead, it is merely moistened, then fed into a rotating rubber-lined cylinder. Rolling loosely on the bottom are several rubber-covered metal rods. Riding over the grain, these apply just enough pressure to loosen the corky epidermis, which is blown off.

Science News Letter, February 10, 1945



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MEDICINE

Streptomycin Effective For T.B. in Guinea Pigs

➤ STREPTOMYCIN, one of the newest of the germ-against-germ medical weapons, can exert a "striking suppressive effect" on tuberculosis in guinea pigs, Dr. W. H. Feldman and Dr. H. C. Hinshaw of the Mayo Foundation and Clinic have reported.

What effect it might have in suppressing tuberculosis in humans is not stated in their report, recently published (*Proceedings, Staff Meetings, Mayo Clinic*, Dec. 27).

Streptomycin, which is obtained from a bacillus that lives in earth, was discovered by Dr. Selman A. Waksman, Dr. Albert Schatz and Dr. Elizabeth Bugie, of Rutgers University and the New Jersey Agricultural Experiment Station. They found it a powerful weapon against tuberculosis germs in test-tube experiments and suggested the guinea-pig trials to the Mayo group, which has been investigating the anti-tuberculosis action of other new substances.

* Streptomycin, they found, does not have any toxic effect on guinea pigs. The animals can stand daily doses without any harm. Doses of human tuberculosis germs that caused widespread and destructive infection in the bodies of untreated guinea pigs caused hardly any detectable signs of disease in the animals that got daily doses of streptomycin.

Science News Letter, February 10, 1945

CHEMISTRY

Eggs Kept in Edible Condition for One Year

➤ EGGS—best replacement for point-scarce meats—may be kept in good edible condition for as much as a year by means of a new flash heat treatment developed by Prof. Alexis L. Romanoff of Cornell University.

The treatment is very simple, and requires only such equipment as may be found in an average kitchen. It consists merely of plunging the eggs in boiling water for five seconds, letting them cool, and putting them away in a refrigerator. Eggs thus treated may even be kept without refrigeration, but they will stay good for only about three months, as contrasted with 12 months in the refrigerator. Cold-storage eggs remain in edible condition for about six months, Prof. Romanoff states.

Science News Letter, February 10, 1945

Do You Know?

The first transatlantic *radio-telephone* message was transmitted in 1915.

Vitamin K is not stored in any significant amount in the body.

Crude petroleum oil was bottled and sold less than a century ago, represented to have "wonderful curative powers."

Arizona leads the United States in *copper* production and has done so for 34 years.

Spain has a new type of *railroad train*; it is streamlined, light, swift, comfortable, and economical to build and operate.

The *London zoo* was damaged by 12 German robot bombs but no serious harm done to the animals.

Some 6,000,000 *refrigerators* will be in demand immediately after the war; in 1941 the number built was approximately 3,700,000.

The 27,000,000 milk *cows* in the United States in 1943 produced nearly 55,000,000,000 quarts of milk or over 2,000 quarts each.

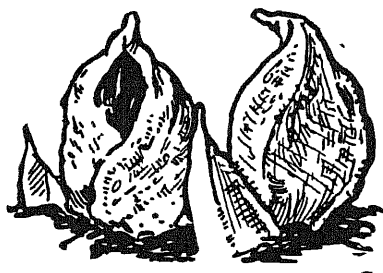
Only two of the 3,000 kinds of *lizards* that inhabit the world are poisonous, these two are the Gila monster and the Mexican bearded lizard.

With the shortage of *coal* in Sweden due to stoppage of importation from Germany, wood has become the most important available fuel.

Rochelle *salt crystals* possess the necessary properties to make them usable instead of quartz in radio work but their employment is limited because they melt at 120 degrees Fahrenheit.

Wolverine fur is highly prized in Alaska, not alone because of its scarcity, but because it will not ice up from the breath as other furs do, and therefore is used to line parka hoods next to the face.

Asparagus butts, now wasted, yield, when pressed, a juice than can be used as a culture medium to produce bacterial proteinase, an enzyme that splits proteins; it is used in the brewing, textile, leather and rubber industries.



Spring's Precursors

► WINTER'S death-tyranny is never complete; there is always an underground rebellion of life, breaking into overt expression at the least relaxation of the cold's iron grip. Let a few warm days intervene between cold waves, at any time during the winter, and you are likely to see flowers on the bare branches of such shrubs as forsythia and oriental honeysuckle, in which dormancy seems to be of the lightest, and very easily broken. Wild violets in January or Feb-

ruary are no uncommon occurrence, either. If there is a more prolonged spell of mild weather, slightly more reluctant spring blossoms begin to appear: lilac and flowering crabapple, silver maple and elm.

These are plants that normally "go to sleep" in autumn and are not due to flower before spring. Their buds will not develop until they have felt the pinch of frost. In some of them, however, a very light pinch suffices to unlock the chemical mechanism that controls dormancy, and the first warm spell after the first cold spell may bring on their precocious opening. As a rule, these little previews of spring do the plants no harm: there is still a large reserve of buds remaining unaroused, that will take care of the main flowering period when the time comes.

Then there are the flowers that bloom, not in the spring, but in the gray, chill dawn-time of the year, that precedes spring. We naturally think of such things as willow and alder catkins, and above all of that purple-nosed little toughie of wildflower society, the skunk cabbage. Given sun on their heads, willow and alder do not mind snow about their feet; their trunks and branches contain reserve resources enough to take care of

the job of flowering, without demanding anything of the still-chilled roots. And skunk cabbage often pushes up through inches of snow, or cracks thin ice in the swamp-water standing over it. It is time for them to bloom, and they will not be denied.

Perhaps the maddest of all these flowers that do not wait for the returning sun to climb high in the heavens is witch hazel. This odd shrub blossoms only in the winter; its yellowish flowers, with their four stringy, strapshaped petals, may be seen on its leafless brown twigs at any time from late November until early March. But by the time the first shy buds of trailing arbutus begin to unfold, and before the earliest bloodroot shames the fading snow-patches with its pearly petals, the flowers of witch hazel, true to their elfin name, have vanished.

Science News Letter, February 10, 1945

More than 2500 products use *tin* cans for packaging.

A new *artificial leg*, invented in Sweden, is made of light metal and has knee, ankle and toe joints; the knee joint has an automatic lock which releases and locks with each step and prevents buckling when standing.

At This Beginning of 1945...

a year during which the world's food supply may have to be rigidly apportioned—it may be well to remember the warnings and admonitions of public health teachers: Dietary proteins should not be reduced below 1 Gm. per kg. of bodyweight; the morning meal should contain more protein than the typical American breakfast offers; in diseases characterized by high NPN blood levels, dietary protein should not be reduced below protein requirement levels; in diseases conducive to protein loss, a diet high in protein is indicated.* Meat ranks high among protein foods, not only because of its high protein content, but also because its proteins are of highest biologic quality, the RIGHT KIND for every protein need.

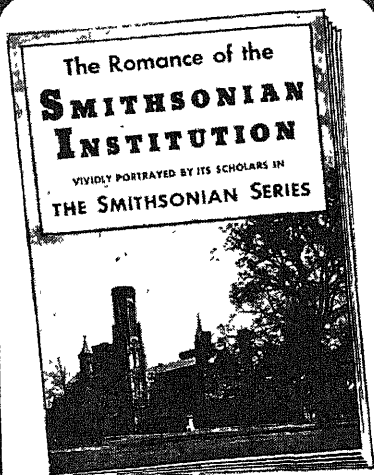
*Stare, F. J., and Thorn, G. W.: Some Medical Aspects of Protein Foods, *Am. J. of Public Health*, 33:1444 [Dec.] 1943.



The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

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➤ YOUTHS AND adults without scientific background, will be interested in **ELECTRONICS FOR BOYS AND GIRLS**, by Jeanne Bendick. It explains in easily understood language what electrons are, and how they are put to work to accomplish wonderful results in manufacturing wartime and other equipment (McGraw, \$1.50.)

Science News Letter, February 10, 1945

➤ **INDUCTION HEATING** and dielectric heating, processes now widely used in industries, are excellently covered in **HIGH-FREQUENCY INDUCTION HEATING** by Frank W. Curtis. It is a book for foremen as well as engineers and students. It contains many illustrations of installations in actual commercial use contributed by some of the makers and users of high-frequency equipment (McGraw, \$2.75).

Science News Letter, February 10, 1945

➤ **ENGINEERS** and industrial chemists will be particularly interested in **COMMERCIAL METHODS OF ANALYSIS** by Foster Dee Snell and Frank M. Biffen, but universities training chemical engineers and chemists for industries will be equally interested. Especially, it shows the method of approach to analysis of the innumerable complex commercial products on the markets including the colloids. (McGraw, \$6.00)

Science News Letter, February 10, 1945

Just Off the Press

CIVIL AVIATION AND PEACE—J. Parker Van Zandt—*The Brookings Institution*, 157 p., \$1.

EDWARD BELLAMY—Arthur E. Morgan—*Columbia Univ. Press*, 468 p, illus., \$5

ELECTRONICS FOR BOYS AND GIRLS—Jeanne Bendick—*McGraw*, 148 p, illus., \$1.50.

FOOD REGULATION AND COMPLIANCE—Arthur D. Herrick—*Revere Pub. Co.*, 646 p, \$10 (vol. 1).

HENLEY'S TWENTIETH CENTURY BOOK OF FORMULAS, PROCESSES AND TRADE SECRETS—*Henley*, 865 p, \$4, rev. ed

LABORATORY MANUAL FOR GENERAL BACTERIOLOGY—Univ. of Minnesota—W. B. Saunders, 54 p., paper, illus., \$1.

PIONEERING THE HELICOPTER—Charles Lester Morris—*McGraw*, 161 p., illus., \$2.75.

A STORY OUTLINE OF EVOLUTION—Charles W. Grimes—*Humphries*, 244 p, \$2.

TECHNOLOGISTS' STAKE IN THE WAGNER ACT, the National Labor Relations Act in Operation as it Affects Engineers, Chemists and Architects—M. E. McIver and others, eds.—*Am. Assn. of Engineers*, 260 p., paper, \$2.

VAPOR TRANSMISSION ANALYSIS OF STRUCTURAL INSULATING BOARD—Frank B. Rowley and C. E. Lund—*Univ. of Minn.*, 71 p, paper, illus., 40c (Engineering Experiment Station Bulletin No. 22).

WHAT FOREIGN TRADE MEANS TO YOU—Maxwell S. Stewart—*Public Affairs Comm.*, 31 p, paper, illus., 10c (Public Affairs Pamphlet No. 99).

WHEN HE COMES BACK AND IF HE COMES BACK NERVOUS, Two Talks to Families of Returning Servicemen—Thomas A. C. Renne and Luther E. Woodward—*Nat. Comm. for Mental Hygiene, Inc.*, 32 p, paper, 15c

Science News Letter, February 10, 1945

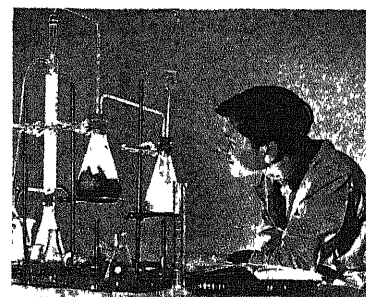
INVENTION

Spray Method Used for Silver Coating Mirrors

➤ A SIMPLE kind of inorganic chemistry is involved in a method for silvering mirrors, offered by two Canadian inventors, Charles Trevaill and Kurt P. Gladney of London, Ont., for patent 2,367,903. Over the surface to be silvered a fine spray is released, in which silver nitrate solution is mixed with a reducing solution containing hydrazine sulfate and the sulfate of one of the alkali elements such as potassium or ammonium. Patent rights are assigned to Hobbs Glass, Ltd., of London, Ont.

Science News Letter, February 10, 1945

Facts ABOUT



SCIENTISTS OF TOMORROW

— — — LISTEN — — —
"ADVENTURES IN
SCIENCE"

WITH
WATSON DAVIS
AND
Talent Search Winners
SATURDAY, FEB. 17
2:15 EWT—CBS
Science Service Feature

• New Machines and Gadgets •

☛ **DRINKING** fountain, quickly attachable to the ordinary faucet, is a pocket-size tubing upturned on each end. One end is threaded to fit the faucet; the other, smaller in size, is drawn out to a nozzle.

Science News Letter, February 10, 1945

☛ **HOOK-TYPE** wrench for both nuts and pipes has a hinged auxiliary handle fitted in a slot extending lengthwise in the regular handle. The grip of the hand forces the face of the auxiliary handle through the slot and against the nut, holding it firmly against teeth on the jaw of the hook.

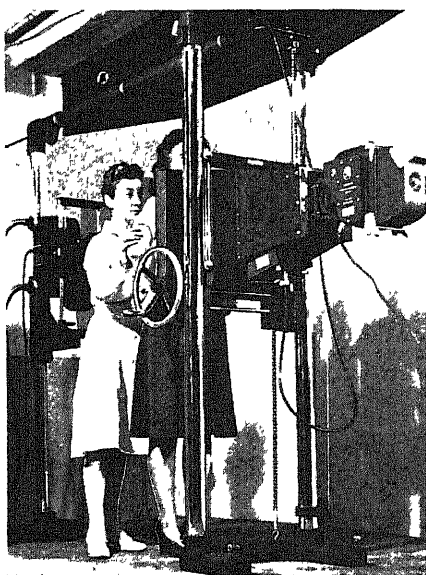
Science News Letter, February 10, 1945

☛ **SAFETY** shield for cigars and cigarettes, when placed over the burning tobacco, permits smoking during blackouts by hiding the glow. It also catches and holds sparks and ashes. The cigar or cigarette is slipped into the ventilated shield and lighted through a tiny trap-door on one side.

Science News Letter, February 10, 1945

☛ **FLUORESCENT** lamps are coated by a new method with the phosphors that make them glow. The tube to be coated is slipped over a fine tungsten wire to which high-voltage electricity is applied. Dry phosphor powder is blown in. The particles become electrically charged, fly to the glass, discharge and stick.

Science News Letter, February 10, 1945



☛ **EQUIPPED** with a phototimer that permits the taking of six uniform, accurate photographs a minute, the X-ray apparatus is shown in the picture. Used for chest surveys in checking tuberculosis, the timer measures the X-radiation coming through the chest and cuts it when the proper exposure has been made.

Science News Letter, February 10, 1945

☛ **WOOD SURFACES** are made fireproof, waterproof, denser and harder by a treatment just patented, which includes coating with a mixture of pulverized asbestos in a standard urea-formaldehyde glue and pressing moderately between

heated metal plates. The finished surface is nearly as hard as glass.

Science News Letter, February 10, 1945

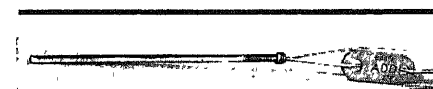
☛ **YARN WINDING** and holding device is mounted on one wrist, leaving both hands free for knitting. It consists of a metallic or plastic wristlet with a projecting arm on which is a revolving cylinder about which the yarn is wound. The yarn unwinds as used.

Science News Letter, February 10, 1945

☛ **ROLL FILMS** in a camera are advanced the proper distance with one stroke of the operator's hand by use of a simple device. A lever on the side of the camera forces rack teeth to mesh with a gear on the shaft and rotate the shaft the exact distance required.

Science News Letter, February 10, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N. St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 245.



4-inch miniature pipe-type couple which can be supplied in 8 lengths from 4 inches up to 36 inches.

MINIATURE THERMOCOUPLES

To measure temperature in pilot plants, or laboratory processes, where the space available for the temperature-detector is limited, we recommend our pipe-type thermocouple shown above, used with either a laboratory potentiometer, or with a Micromax recording or controlling potentiometer pyrometer.

These couples consist of parts similar to the usual thermocouple, except, in place of two wires, there is one wire (constantan) with asbestos insulators, enclosed in a 1/8-inch steel tube and welded to its closed end. The tube walls are 0.022-inch thick and so are extremely sensitive. These couples are not only accurate to within our guaranteed limit of error at all temperatures, but are also checked and tagged with correction figure at 500 F. They can, of course, be similarly checked and tagged for any other temperatures. Often where couples are of such length as to cause the insulators of wire-type elements to break, pipe-type couples can be used satisfactorily. Prices on request, state length wanted.



Jrl. Ad. N-38A(12a)

Question Box

ASTRONOMY

What star has white dwarfs for both of its components? p. 87.

CHEMISTRY

How does the addition of selenium improve lubricating oils? p. 89.

How is it possible to keep eggs in an edible condition for a year? p. 92.

What is the advantage of the new phosphate glass? p. 84.

What new use has been found for synthetic rubber? p. 86.

DENTISTRY

What causes toothache at high altitudes? p. 82.

ELECTRONICS

What is the "starlight" tube? p. 82.

GENERAL SCIENCE

How will future plans for standards work be formulated? p. 87.

HORTICULTURE

What may make it possible to produce redder apples? p. 88.

INVENTION

What are some of the urgent appeals that the Navy has made to inventors? p. 83.

MEDICINE

How effective is streptomycin for the treatment of T.B. in guinea pigs? p. 92.

NUTRITION

What is the best way to help China feed her millions? p. 84.

PHYSICS

How long ago was the first American-made battle rocket launched? p. 90.

Where published sources are used they are cited.

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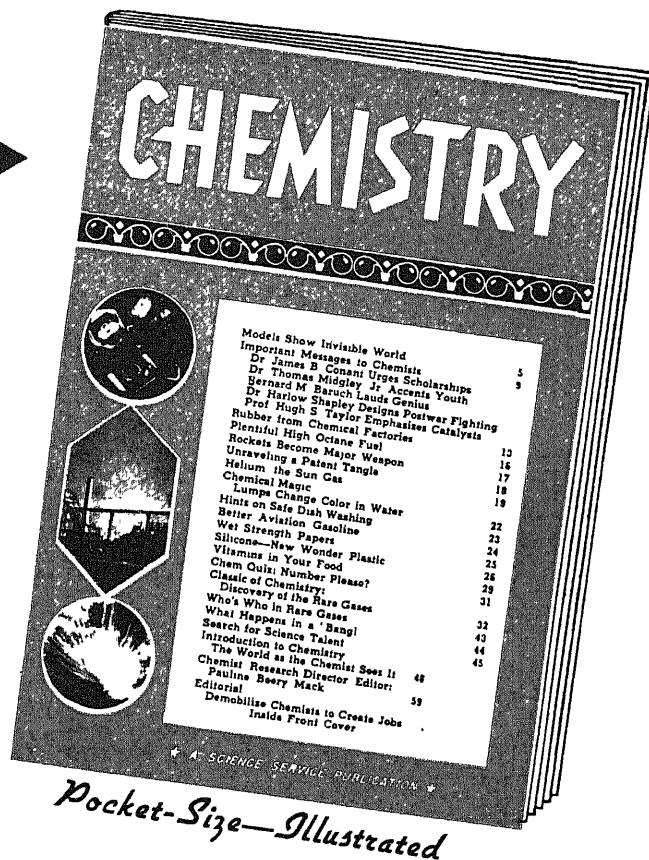
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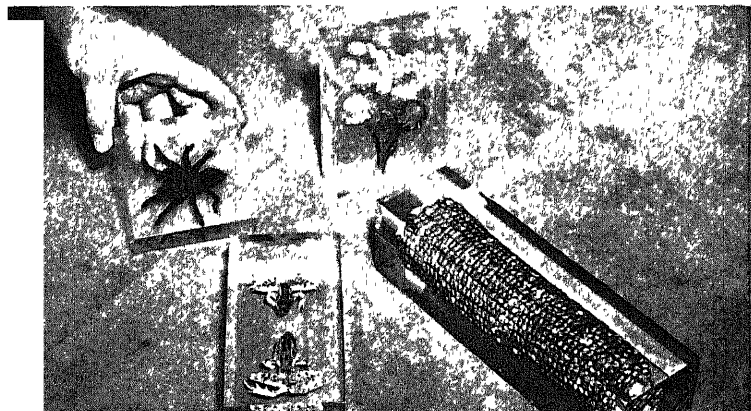


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THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 17, 1945



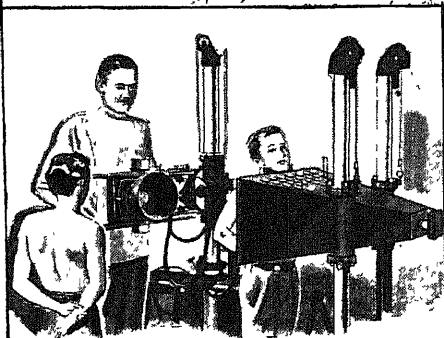
Waterspout
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Smithsonian Library

WONDER-WORKING WITH ELECTRONS

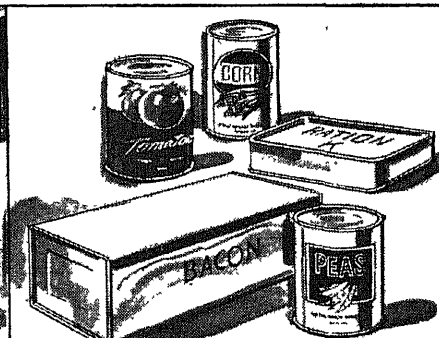
BOMBERS FROM THE BOTTOM OF THE SEA... There's a fabulous amount of magnesium... enough for 4,000,000 Flying Fortresses... in every cubic mile of sea water. To extract this vital metal from the ocean, vast quantities of d-c electricity are needed. An electronic device, the Westinghouse Ignitron, supplies this current by changing a-c to d-c — right at the water's edge. Ignitrons, with a combined capacity of more than 3,000,000 kilowatts, are now at work in magnesium, aluminum and chlorine plants, in electric railway systems, in mines, in many war industries.



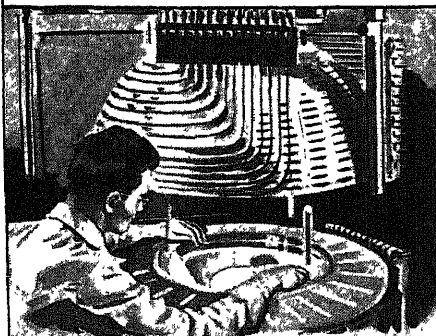
A NEW X-RAY machine, built by Westinghouse, makes possible the examination of 1000 school children daily — for symptoms of tuberculosis. X-ray pictures are taken by a 35 mm candid camera — at a cost of less than 1¢ per exposure.



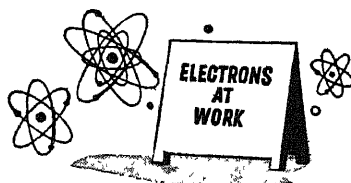
DUST TAKES A HOLIDAY... Dust-free air is absolutely essential in the assembly of optical equipment for our fighting forces. The Westinghouse Precipitron* electronic air cleaner automatically removes dust particles down to the size of 1/250,000th of an inch.



S-T-R-E-T-C-H-I-N-G THE TIN SUPPLY... Electronic high-frequency induction heating — developed by Westinghouse — helps save two-thirds of our war-scarce tin supply by flowing a protective tin coating, only 30-millionths of an inch thick, on steel strip.

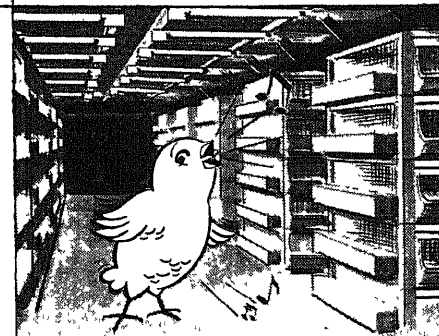


ELECTRONIC CHEMIST... The Westinghouse Mass Spectrometer analyzes intricate gas mixtures at amazing speed. In making synthetic rubber, for example, this electronic device cuts the time of chemical analysis from days to a matter of minutes.



Although one of the tiniest things in the universe, the electron is a gigantic force for the good of mankind. It is helping us to win the greatest war in history. It speeds production of goods for war and peace... brings entertainment into our homes... contributes to our health and happiness in countless ways. And wherever you find electrons at work you will find Westinghouse electronic research at the forefront!

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SOMETHING TO CROW ABOUT... The Westinghouse Sterilamp, an electronic device, deals sudden death to air-borne bacteria in chick brooders — has reduced chick mortality by 50%. Sterilamps are used in restaurants, canneries, breweries, etc.

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NUTRITION

Emigration and Food

Running rats lead to new view that emigration among mammals is the result of food scarcity or deprivation but is not a planned response.

➤ A NEW view of the relation between food scarcity and emigration comes from a study of the activity of rats deprived of food. The study was reported by Dr. George Wald and Dr. Blanche Jackson, of Harvard University, to the National Academy of Sciences and is reviewed, in *Nutrition Reviews* (February).

Emigration among mammals, the Harvard studies suggest, is the result of food scarcity or deprivation but it is not a planned response. Animals do not, as has been generally assumed, emigrate in order to find food. They emigrate because the lack of food forces them into increased activity. Ancient history suggests that man may share in this pattern of response to food scarcity.

The real purpose of the emigration, or its "essential biological function," as the Harvard scientists put it, "is not to rescue the emigrating animal, though this may occur, but to relieve nutritional pressure on the home population."

The individual emigrant wanders aimlessly and persistently. Usually his wanderings end in disaster. If he survives, it is because he has happened to wander in the direction of a food supply.

The study supporting this new view was made with rats kept in activity cages in which they had free access to a running wheel. Normally, they ran an average of slightly under half a mile to slightly over a mile daily, or something under 2,000 revolutions of the wheel.

When the rats were deprived of food

or of water, their activity greatly increased. The revolutions of the wheel went up to about 10,000 daily. The same increased activity occurred when the rats were deprived of thiamin (vitamin B₁) or of another B vitamin, riboflavin. Deprivation of vitamin A and of various minerals in the diet did not have this effect.

The rats deprived of thiamin for long enough to result in polyneuritis finally ran much less than normally. If they are then given thiamin and allowed to eat freely, they quiet down and do not run much, meanwhile eating enormously and gaining weight. If they are given thiamin without increased food, they run enormously, because they are hungry for bulk food.

"High running," the scientists state, "is not, therefore, a reliable sign of well-being and optimal performance. It may be a sign of want. When healthy, intact animals are most completely provided with their needs they run minimally. This relation may be used as a criterion of dietary adequacy."

Running, they report in this connection, was consistently higher in a large group of animals kept on a synthetic diet containing all the factors known to be required by rats than when on a complete diet consisting largely of natural foods. This suggests that the synthetic diet still lacked factors which rats require and which have not yet been identified.

Science News Letter, February 17, 1945



ARTIFICIAL CLOUDS—Created in a bottle from liquid air and warm water, they are used to test insulating materials for the electrical systems of new bombing planes at the Westinghouse Research Laboratories.

usually brilliant or eminent men and women.

The brains are kept in glass jars on the shelves of his laboratory. On nearby tables on occasion may be seen hundreds of glass slides containing .031-inch slices from human brains. In the process of analyzing or "running through" a brain, 2,000 slices are made from one human brain. Every tenth one is mounted on a slide so it can be scanned under the microscope.

Condition of the brain cells and the structure are correlated with facts about the person's physical and mental characteristics. The information is important to brain specialists in treating their patients.

Dr. Papez says brains should be removed as soon as possible after death to be of value to the scientist.

The present collection was started many years ago by Dr. Burt G. Wilder, first professor of animal biology at Cornell. Latest acquisition is that of Prof. Simon H. Gage, who died last Oct. 20 at the age of 93.

Dr. Wilder retired in 1910 and the collection was more or less at a standstill until Dr. Papez joined the faculty in 1920. Where Dr. Wilder was more concerned with the anatomy of the brain, Dr. Papez is more interested in the microscopic work giving neurological information, and consequently in brains which present problems.

Dr. Papez says there are 26 basic items

MEDICINE

Brains For Study

Those of abnormal persons are more interesting to science than normal ones, head of Cornell Brain Association says.

➤ IF YOU are abnormal, the chances are science will be more interested in your brain than if you are a perfectly normal human being.

Cornell University has a collection of nearly 1,000 human specimens, and Prof. James W. Papez, curator of the collec-

tion and secretary of the Cornell Brain Association, says they are interested only in those brains that contribute most to science. These are the brains which present problems such as faculties that have been lost and recovered, brain diseases, congenital cripples, or the brains of un-

to study in a brain, and that it takes considerable time and costs several hundred dollars to "run one through."

The originator of the collection, Dr. Wilder, so inspired his students that many of them voluntarily signed a bequest form which he drew up as follows:

"Recognizing the need of studying the brains of educated persons rather than those of the ignorant, criminal, or insane, in order to determine their weight, form, and fissural pattern, the correlations with bodily and mental powers of

various kinds and degrees, and the influences of sex, age, and inheritance, I hereby declare my wish that, at my death, my brain should be intrusted to the Cornell Brain Association or to the curator of the collection of human brains in the museum of Cornell University for scientific uses, and for preservation, as a whole or in part, as may be thought best. It is my hope that my family and friends may not oppose the fulfillment of this my earnest wish."

Science News Letter, February 17, 1945

MEDICINE

Beriberi Cure Rapid

Americans rescued from Jap prison camp should recover quickly from this poor-diet disease; treatment will probably be doses of thiamin.

► CURE of beriberi, from which Americans rescued from the Cabantuan prison camp are said to be suffering, is usually very rapid. Improvement will come in a matter of hours after treatment is started, if the rescued men have not suffered irreparable damage to nervous system or heart.

The treatment will doubtless consist in giving large doses of thiamin, also known as vitamin B₁. This chemical, which is both cure and preventive of beriberi, was first synthesized by an American scientist, Dr. Robert R. Williams of the Bell Telephone Laboratories, as a result of studies on beriberi which he started in the Philippines in 1910.

Long before the vitamin had been isolated and synthesized, it was known to occur in foods and beriberi was known as a disease resulting from a poor diet. Ironically, one of the first persons to advocate that beriberi resulted from poor diet was the Surgeon General of the Japanese Navy, Takaki. In 1884 he was able to wipe out beriberi in that navy almost completely by changing the ration. It is reasonable to assume that the rations of Japanese sailors and soldiers today contain plenty of the anti-beriberi vitamin.

Oriental living chiefly on rice are likely to get beriberi because they eat polished rice. The polishing removes the thiamin from the rice, just as thiamin is removed from wheat in the processing of our fine white flour. To overcome this, our bread is now enriched by addition of thiamin as well as other vitamins and iron.

Beriberi has been considered relatively rare in the United States, but one au-

thority writing in 1943 stated that this is not true. The symptoms of the disease vary greatly. They include neuritis, muscle weakness and wasting, loss of coordination and of sensation, dropsy, and, when the heart is affected, difficulty in breathing, pain around the heart, blue color of the skin and rapid pulse.

Treatment of beriberi includes feeding a good diet as well as giving doses of the vitamin, thiamin. In this country, persons who had been eating such a poor diet that they got beriberi would probably also suffer from lack of other B vitamins. In the Orient, the poor diet that leads to beriberi apparently does not lead to other vitamin deficiencies.

For the people rescued from Cabantuan, the diet may consist in frequent small feedings of concentrated foods, but they are more likely to be given as much as they can eat. The danger of overfeeding is not the same for these malnourished persons as for men rescued from a life raft who have had nothing to eat for 30 days. Such persons cannot eat a lot all at once, probably because their digestive functions have been impaired. That is not so true in cases of vitamin deficiency and general malnutrition.

Science News Letter, February 17, 1945

INVENTION

Casein Curds Floated Out By Use of Carbon Dioxide

► FOR AN improvement in the method for extracting casein, milk's principal protein, E. L. Fritzberg of Minneapolis has been granted patent 2,368,919, which he has assigned to General Mills, Inc.

The conventional way of getting case-

in out of milk involves adding acid, which produces heavy curds that sink to the bottom. Subsequent handling renders the casein unfit for human food, so that it has to be diverted to lower-priced industrial uses. In Mr. Fritzberg's method, carbon dioxide or some other gas is introduced into the milk during the acidulating process, which results in the formation of bubbly curds that float to the top and can be mechanically skimmed off in cleaner condition, suitable for eventual incorporation into food products.

Science News Letter, February 17, 1945

SCIENCE NEWS LETTER

Vol. 47 FEBRUARY 17, 1945 No. 7

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ORNITHOLOGY

Heartbeats Counted

Using an extremely sensitive electrical instrument known as a cardio-vibrometer, the extra-rapid heartbeats of birds are accurately measured.

► EXTRA-RAPID heartbeats of birds, which normally have rates several times that of human beings, have been accurately counted in experiments by Dr. Eugene P. Odum of the University of Georgia, using an extremely sensitive electrical instrument known as a cardio-vibrometer. This has the advantage of not constraining the bird in any way, since nothing is attached to its body; there is thus no falsification of the record through fear or excitement. The instrument is attached only to the twig on which the bird perches, or even under the nest, and the very slight vibration caused by the heartbeat, translated into terms of electric impulses and amplified, is recorded by an automatic pen.

Dr. Odum measured the heartbeat rates for the tame canary and for nine species of wild birds, ranging in size from the mourning dove down to the ruby-throated hummingbird. In general, the smaller the bird the faster the pulse rate: the average basal rate for the ruby-throat was found to be 615 beats per minute, while that of the mourning dove is only 135—approximately twice the human heartbeat rate.

Heartbeat rates in birds can be speeded up terrifically under conditions of excitement or exertion: five of the ten birds tested had maximum rates of over 1,000 beats per minute, and all except the dove had maxima in excess of 800 per minute.

These extreme rates were maintained for only short periods; normally the rates were much lower, though still very high as compared with the rates in human beings. Thus, the basal rate in the dove was 135, while the maximum was 570. The cardinal had a basal rate of 445, a maximum of 810; the English sparrow's basal rate was 350, its maximum 902; the chipping sparrow had a basal rate of 440, a maximum of 1,060.

One peculiar phenomenon was noted in the case of naked young birds in the nest, which are cold-blooded, like lizards or frogs, when first hatched. Their heart rate at hatching changes directly with rise and fall in temperature, as a frog's heart does. However, as they be-

come a little older and assume their character as warm-blooded animals, increases in temperature bring a slowing-down of the heartbeat, and decreases speed it up.

Dr. Odum gives details of these and other observations in a report in *Science* (Feb. 9).

Science News Letter, February 17, 1945

First Baekeland Award To Be Given Dr. Gilliland

► THE Leo Hendrik Baekeland Award of the North Jersey Section of the American Chemical Society will be presented in May to Dr. Edwin Richard Gilliland, professor of chemical engineering at the Massachusetts Institute of Technology, and formerly Assistant Rubber Director. He will be the first recipient of this award, which will be made biennially to an American chemist under 40 years of age for achievements in pure or industrial chemistry.

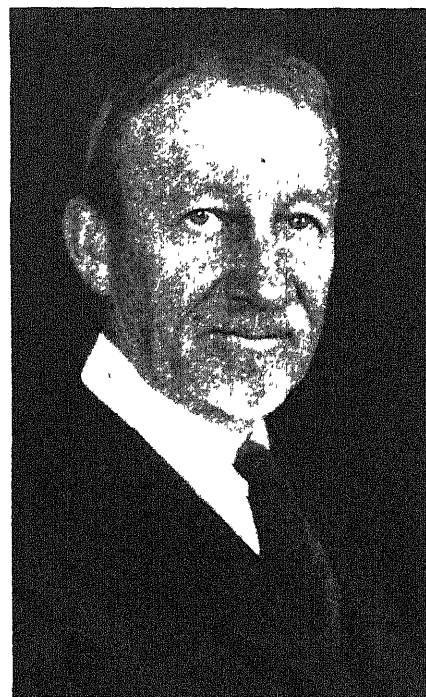
The Baekeland award, a gold medal and \$1,000 cash, was founded to commemorate the technical and industrial achievements of Leo Hendrik Baekeland, who died a year ago at the age of 80, after a life of activity in the chemical research field. He is best known for the invention of bakelite, the first commercial synthetic resin. This invention and the subsequent development of synthetic resins, commonly known as plastics, have had far-reaching effects on modern civilization.

Oklahoma-born Gilliland, who joined the teaching staff at M. I. T. in 1934, is the author of numerous published papers, and is known as an advocate of the maintenance of a postwar synthetic rubber industry in the United States as essential to the national interest.

Science News Letter, February 17, 1945

Dr. William H. Howell, Physiologist, Dies

► THE DEATH of Dr. William H. Howell, distinguished physiologist of the



WILLIAM HENRY HOWELL

Johns Hopkins University, in his 85th year (Feb. 6) marks the end of an epoch in medical education. He was the last surviving member of the first faculty of the Johns Hopkins Medical School, which included the school's internationally known "Big Four," Dr. William H. Welch, Dr. Howard A. Kelly, Dr. William Stewart Halsted and Sir William Osler.

As professor of physiology, dean of the medical faculty and director of the School of Hygiene and Public Health, Dr. Howell contributed in no small measure to the achievements of the Hopkins which, from its start, pioneered a new trend in medical education in this country.

Isolation of the anti-blood clotting substance, heparin, was one of Dr. Howell's own achievements in the medical research for which the institution is famous. His teaching reached far beyond the Hopkins through his *Textbook of Physiology*, widely used and standard text now being prepared for its fifteenth edition.

Besides his role of medical educator, Dr. Howell was interested in education of the general public in science and served for 10 years as chairman of the executive committee of Science Service.

Science News Letter, February 17, 1945

CHEMISTRY

More DDT Victories

Malaria and fly-borne diseases are controlled by spraying a 5% solution in kerosene in mess halls, kitchens, and military sleeping quarters.

➤ DDT, already acclaimed for success in aborting the typhus epidemic in Naples, now is helping to control malaria and fly-borne diseases, reports Maj. George C. Brother of the Medical Corps, attached to the 15th Air Force. Units of enlisted airmen directed the killing of adult mosquitoes and flies in the area, using a 5% DDT solution in kerosene, and applying it with power paint sprayers, hand spray guns and paintbrushes to prevent the spread of malaria and diseases carried by flies. The mixture is applied by two-man teams to military mess halls, kitchens, latrines, and civilian as well as military sleeping quarters.

DDT arrives in Italy in hard, waxy lumps, which are pulverized in a meat grinder. The solution is made up by

adding the pulverized DDT to kerosene and pouring it into five-gallon oil cans. Cans of this mixture are stacked in the sun to hasten solution and are rolled around on the ground every 24 hours. A good solution is obtained in about four days.

Spraying teams, after a half-day of schooling in malaria control, begin applying the poisonous solution to walls, doors and screens of buildings. The men wear protective masks. These teams also seek out nearby breeding places of flies and of mosquitoes which might infect soldiers with malaria.

Some reports indicate that the insecticide did not have immediate results. However, after several days medical officers were convinced of its effectiveness. Observations show that areas have

to be re-sprayed about every month or six weeks.

According to Maj. Brother, the results have been spectacular from the standpoint of pest control, and DDT can be considered valuable to the prevention of both malaria and enteric diseases.

Science News Letter, February 17, 1945

GENETICS

Children Do Not Inherit Weakness for Strong Drink

➤ CHILDREN of alcoholic fathers or mothers do not inherit their parents' weakness for strong drink, a study of 36 such children who had been raised in foster homes revealed to Dr. Anna Roe, of Yale's Section on Alcohol Studies of the Laboratory of Applied Physiology (*Quarterly Journal of Studies on Alcohol*, December).

The children were studied after they were grown; they averaged 32 years of age at the time of the study. And they were compared with a control group, also raised in foster homes, who were the children of non-alcoholic parents.

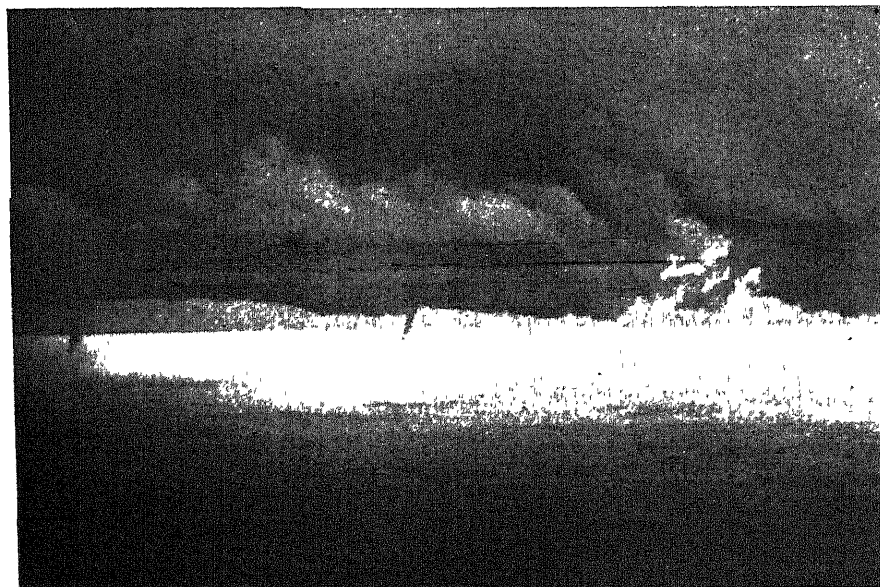
No drunkards were found among either of the groups. Of the alcoholic-parentage group, 7% use alcohol regularly, 63% occasionally and 30% do not touch it at all. The figures were not very different for those whose parents were not alcoholics. Of these, 9% use alcohol regularly, 55% use it occasionally and 36% are teetotallers.

Of children of alcoholic parents brought up by their own parents 20% to 30% become alcoholics, it has previously been found.

Although alcoholism is a disease chiefly of later life, the good adjustment of the group studied by Dr. Roe and the absence of heavy drinking at the age of 32 would seem to indicate that they are no more likely to become alcoholics later than are the rest of the general population, Dr. Roe concludes.

The children of the alcoholic parents were not placed in their foster homes until they were between five and six years old, as compared with two and a half years for the other group. Many were abused by their own parents and the foster homes were not quite so good as those of the children of normal parentage.

Dr. Roe expresses surprise that they turned out so well in spite of this early handicap, becoming not only useful citizens but reasonably contented persons, working adequately, with pleasant family lives and sufficient friends.



WATERPOUTS—This picture, and the one on the front cover of this *SCIENCE NEWS LETTER*, help dispel the belief that waterspouts are "solid" columns of water. Actually they are rotating columns of cloud. The ones seen in these rare photographs taken by Lt. R. W. Field, Jr., of the Mediterranean Allied Air Forces, are 200 feet in diameter and 2,000 feet high. They are the result of convective activity that occurs when cold air moves over a warm sea area, and can be best likened to a tornado over water. The spray at the base of the waterspout obscures the point where it touches the water and indicates an area of destructive winds about 500 feet in diameter. Beyond that area the water is scarcely disturbed.

"No one who has read the records of some of these lives and pondered on them can escape a profound sense of awe

at the biological toughness of the human species," she comments.

Science News Letter, February 17, 1945

BIOCHEMISTRY

Vitamin Factory

The fact that a cow's stomach can turn out a surplus of B-complex is again engaging the attention of scientists. Work is done by bacteria.

➤ A COW'S stomach is a vitamin factory, capable of turning out not only enough B-complex for her own needs but a surplus that is excreted with her digestive wastes. This fact, originally discovered in researches at Pennsylvania State College some 15 years ago, is again engaging the attention of scientists.

Specifically, the part of the cow's complex stomach where vitamins are produced is the pouch known as the rumen. The vitamin manufacture is not accomplished by the body processes of the cow herself but by swarms of bacteria living in the rumen, working on the often low-vitamin diet on which the animal feeds.

Vitamin benefits from the cow's digestive processes have been known in a crude fashion for a long time: it is a common barnyard observation that skinny, runty chickens "perk up" if they have a chance to scratch for chance grains in a heap of cow manure.

Conclusive evidence that vitamins of the B-complex are synthesized by bacterial action in cows' rumens was obtained in 1928 by S. I. Bechdel and associates, J. F. Shigley, Hannah E. Honeywell, R. Adams Dutcher, and M. H. Knutsen. They had found previously that young calves make normal growth on rations shown to be vitamin B-complex deficient in tests on rats.

Penn State Jessie, a cow which achieved great public interest because of the window in her side, figured largely in these vitamin B synthesis tests, supervised by Dr. Bechdel. Quantities of partially digested feeds were removed through this opening for chemical and bacterial analysis.

Subsequent experiments at other stations have shown that a cow produces sufficient of the B-complex vitamins for her own needs from feeds low in this constituent, and if properly fed, excretes large quantities which may be used by other animals.

Scientists and feed manufacturers now are concerned with the problem of how

to include the B vitamin eliminated in cow manure in feeds for other forms of livestock without offending customers or an over-sensitive public. The source of vitamin B fed may be quickly forgotten, however, if superior animal products result.

Science News Letter, February 17, 1945

ELECTRONICS

X-Ray Tube Takes Pictures In Millionth of a Second

➤ EQUIPMENT containing an X-ray tube which takes pictures in a millionth of a second is now used by an Army arsenal to study the behavior of a bullet passing through the bore of the gun and its piercing action as it hits an object, and also the behavior of a high-explosive shell as it hits a steel plate. It can also be used to study the action of the component parts of valves or of other machinery during operation, and to photograph accurately such action as the inner structure of golf balls at the moment of impact.

Ultra-speed X-raying is the "only adequate method of determining how a bullet or shell behaves as it hurtles down the bore of a gun or as it strikes the target," explained Dr. Charles M. Slack of the Bloomfield plant of the Westinghouse Electric & Manufacturing Company, who developed the tube, at a recent meeting of scientists in Cleveland. "One failed bullet might jam a machine gun, and studies made possible by high-speed X-ray photographs at arsenals and proving grounds in this country and in Great Britain have been of inestimable value."

Photographs with the new equipment show that a high-explosive shell inflates to twice its normal diameter just before it appears to finally burst open inside a steel plate, he said, and the blast that accompanies the firing of a rifle bullet will beat the missile to the muzzle of the gun.



RADIOGRAPHS—This series of high speed radiographs shows how a high explosive shell swells up just before it appears to burst open inside a steel plate. In the top picture, the nose of the shell is through the plate; almost half the shell has passed through in the second picture; in the third, the shell has just burst open; and in the last, the shell is wide open, the petals on the back of the plate curling back to make a large hole.

A series of radiographs made with the super-speed tube at an American arsenal showed that the 20-millimeter high-explosive projectile swelled, burst and disintegrated during the penetration process, he added. The force of the explosion blew a huge jagged hole in the steel plate.

The tube will have many postwar uses, he continued, in metallurgical and other industries. It can be used, he said, to study rapidly moving machine parts such as automobile valves. "We no longer will have to wait until those parts perform to see what causes unnecessary wear and failure. With the help of the high-speed X-ray camera we can watch those parts tick while they are ticking."

Science News Letter, February 17, 1945

MEDICINE

Transfusions Needed in Severe Pneumonia Cases

➤ BLOOD and plasma transfusions are needed to complete the life-saving effect of penicillin, sulfa drugs and serum in severe pneumonia, four Boston physicians point out in a report (*Journal, American Medical Association*, Feb. 10).

The four physicians are Drs. S. Howard Armstrong, Jr., Albert C. England, Jr., Cutting B. Favour and I. Herbert Scheinberg.

In two cases they report, penicillin stopped the pneumonia germs, but the patients became so anemic and so starved for protein that they almost died. One patient, an 85-year-old man who developed pneumonia after a prostatectomy, probably had been undernourished and anemic for some time before the operation and pneumonia. Badly fitting false teeth and poor appetite led to a diet consisting chiefly of tea, starches and sweets, with a daily eggnog and occasionally a small piece of pork.

In the other case, there was no sign of undernourishment before the pneumonia. The attack was so severe, however, and involved so much of his lungs that even though the germs were stopped by penicillin, the patient was "in desperate need" of treatment to relieve the difficulty in breathing and in getting enough oxygen into his blood to keep life going.

Such cases will be seen increasingly often, the Boston physicians believe, as powerful antibacterial drugs such as penicillin control germ infections that would otherwise be fatal. They suggest that in severe pneumonias physicians anticipate the development of anemia and deficiency of protein in the blood and give blood and plasma transfusions and adequate protein in the diet early in the sickness.

Science News Letter, February 17, 1945

PHARMACOLOGY

English Titles to Be Used in New Pharmacopoeia

➤ DOCTORS may still write their prescriptions in Latin, but when they look up a drug in the Pharmacopoeia, they want to find it under its English name. Consequently English titles will take first place, Latin titles second place in the new U. S. Pharmacopoeia, scheduled to appear in December 1945, according to an announcement from Dr. E. Fuller-

ton Cook, chairman of the U. S. P. Committee of Revision. Although medical members of the Revision Committee have been the chief advocates of this change, other users of the Pharmacopoeia besides physicians are expected to benefit, since the new style makes possible the grouping of related products in one place.

At present digitalis preparations, for example, are scattered through the book under class names such as Capsulae, Injectio, Tabellae, Tinctura, and the like. This resulted from the style of putting substances in alphabetical order under their Latin titles. The person looking up digitalis capsules had to hunt under Capsulae through all the other kinds till he came to Capsulae Digitalis. Then if he wanted to compare these with requirements or standards for digitalis tablets, he had to search under Tabellae. With the new style, he will merely look for digitalis. All U. S. P. digitalis preparations will be grouped there in alphabetical order.

The Latin titles will not be dropped, but will be placed after the English titles.

Science News Letter, February 17, 1945

CHEMISTRY

John W. Thomas Receives American Chemical Award

➤ THE GOLD medal of the American Institute of Chemists has been awarded to John W. Thomas, chairman of the Firestone Tire and Rubber Company, in recognition of his leadership in rubber research during the past four decades and for achievements in the development and production of synthetic rubber made under his direction. The medal will be presented on May 11 at Columbus, Ohio, during the twenty-third annual meeting of the Institute.

This medal is awarded annually by the Institute for noteworthy and outstanding service to the science of chemistry or the profession of chemist in America. The recipient is selected by a jury of outstanding chemists representing the Institute.

Mr. Thomas, the son of a Welsh coal miner, worked his way through what is now the University of Akron, and received a bachelor of science degree in 1904. In 1908 he installed the first chemical laboratories at Firestone. He made chemical research a major arm of the industry and directed work which developed tires of synthetic rubber more than a dozen years ago.

Science News Letter, February 17, 1945

ENGINEERING

Floating Refrigerators To Carry Cheese, Eggs

➤ THERE'LL BE ice cream, fresh meat, cheese, and eggs for American soldiers stationed in the Pacific war theater, brought to them in a new type of barge the Army has built for the purpose, the War Department reports. Three floating refrigerators, each costing \$1,120,000, can store 64 carloads of frozen meats at 12 degrees above zero in the eight main holds. Two main deck compartments each have a capacity of about 500 measurement tons of fresh vegetables, cheese, eggs, and other perishable produce.

In addition, each barge has a special unit that turns out 10 gallons of ice cream every seven minutes and a plant that manufactures five tons of ice a day. The barge's elaborate cooling machinery is operated by 84 electric motors with capacities up to 150 horsepower. A complete change of arctic air is provided every four minutes to all chill and freeze compartments by 12 blowers.

The barges have flat-bottomed concrete hulls, are 265 feet long with a 48-foot beam and a 12- to 15-foot draft. They carry a crew of 10 men and 13 officers. The floating refrigerators will operate only in the southwestern and western Pacific. Small boats, operated by the Transportation Corps, will pick up the cargo and deliver it to troops, on an inter-island service.

Science News Letter, February 17, 1945

CHEMISTRY

Enamel-Lined Tubes Used To Make Hydrogen Peroxide

➤ A new way has been devised to make hydrogen peroxide—a compound of even greater importance in industry than it is in the theater district. Dr. Gerhard A. Cook of Snyder, N. Y., makes it directly from oxygen and hydrogen gases by putting a properly proportioned mixture through enamel-lined tubes with very smooth walls at a temperature of around 520 degrees Centigrade, at moderately high pressures. On this process he has received patent 2,368,640, rights in which are assigned to the Carbide and Carbon Chemicals Corporation.

Science News Letter, February 17, 1945

PUBLIC HEALTH

Twice As Much Undulant Fever Reported This Year

➤ ALMOST twice as many cases of undulant fever have been reported to the U. S. Public Health Service so far this year as during the corresponding period of 1944. The total to Feb. 3 was 354, compared with 184 for the same period last year.

Undulant fever is also known as Malta fever and brucellosis. It is not often fatal but is a long drawn-out sickness, lasting sometimes for years. The suffering, disability and economic loss are considerable.

People get undulant fever, usually, from drinking raw goat's milk or raw cow's milk that contains the germs. Pasteurizing milk is a sure safeguard against undulant fever from this source. Humans may also get the hog variety of brucellosis, but this is not very common. Farmers, veterinarians, slaughterhouse employees, butchers and even cooks can get it from handling infected meat or from close contact with infected animals.

Reporting of cases of undulant fever is now required in all 48 states and the District of Columbia. Last year, however, was the first in which all states reported the disease. It is possible that during this first year not all cases were reported while more are being reported this year. This might account for some of the increase.

The nation's health is otherwise good with no major increases in communicable diseases reported to the U. S. Public Health Service.

Science News Letter, February 17, 1945

ENGINEERING

Snow May Be Melted as It Falls on Airport Runways

➤ SNOW WILL be melted as fast as it falls on airport runways, if suggestions made by radiant heating experts are put into practice. Underground piping carrying steam or hot water would be used similar to systems successfully operating in the floors of factories and for heating homes. The same method is already used under outdoor walkways and loading strips to keep them clear of ice and snow. It would be cheaper in the long run, it

is claimed, than the present expensive operation of keeping runways cleared by the mechanical removal of the snow.

Snow removal from runways on commercial airports is one of the major problems in areas with heavy snowfalls and many flights have to be cancelled because runways are often snow bound. Airports now are required to have heavy investments in snow-removal machines and expend large sums for labor. Underground heating of the runway to a temperature of about 45 degrees would turn the snow to water, and evaporate the water, keeping the runway dry and always in condition for use. It would do so, it is claimed, at a much less cost than present mechanical removal operations.

The cost of installation would constitute the principal expenditure. Operation and maintenance costs would be low, as heat would be applied to the runway only while snow is falling or drifting. Snow in the air does not make flying hazardous unless severe, but snow or ice on the runways where planes must land is dangerous.

Science News Letter, February 17, 1945

GENETICS

Heredity-Changing Drug Applied by Aerosol Method

➤ COLCHICINE, the drug that changes the hereditary characters of plants by increasing the number of chromosomes per cell, can be applied effectively to scores or hundreds of young plants at a time by the aerosol method, originally used with insecticides to make wholesale kills of winged pests. Use of colchicine as an aerosol was developed by three U. S. Department of Agriculture research scientists, J. W. McKay, P. C. Burrell and L. D. Goodhue, at the great experiment station at Beltsville, Md. They present preliminary results (*Science*, Feb. 9).

Greatest effect in changing the genetic makeup of plants was obtained when the dose was most drastic, the three researchers state. They got highest percentages of change among survivors of blocks of young plants after aerosol-spray treatments that killed most of the seedlings with which they started out.

They also suggest that better penetration of the colchicine, and hence most effective use, may be obtained by mixing into the solution some mildly poisonous chemical that will lower the resistance of growing tissues to penetration. They state that they are now at work on experiments along this line.

Science News Letter, February 17, 1945

CHEMISTRY

Rubberlike Plastics To Coat Cloth, Paper

➤ NEW RUBBERLIKE plastics, with valuable wartime and postwar uses, will be made in the near future in a new plant to be constructed by the Goodyear Tire and Rubber Co., which will have a capacity of 3,000,000 pounds a year. The new materials, developed by scientists of the company during the past two years, can be used to coat cloth and paper, package foods, drugs and tobacco, insulate electric wiring, and protect machinery during shipment to tropical regions.

These new synthetics, that can be used to relieve the critical shortage of natural rubber products, are vinyl chloride copolymers. They are made by passing two gases, acetylene and hydrogen chloride, over catalysts in large tanks by a process very much like that used in making GR-S rubber from butadiene and styrene. GR-S rubber is a co-polymer made by joining the molecules of butadiene to the molecules of styrene. Each of the new co-polymers to be made in the new plant will consist of molecules of vinyl chloride joined with the molecules of some other substance to form the giant molecules of the plastic.

The new plastics can be vulcanized like rubber in the equipment ordinarily used by the rubber industry for that purpose. They resist the deteriorating effects of sunlight, and are also oil-resistant and may be used for gaskets and washers, wherever an elastic, rubberlike substance resistant to oil is required.

An experimental tire has been made of the new material, but it is not expected at present that it will come into general use for tires.

Science News Letter, February 17, 1945

ORDNANCE

Two-Wheeled Carriage For the Heavier Mortars

➤ MORTARS, which up to now have gone into action on men's shoulders, on muleback, or in trucks, are put into the field artillery class by Edgar W. Brandt, the French inventor who is responsible for much of their improvement over the crude weapons of World War I date. He provides a two-wheeled carriage for the heavier types; though his design calls for slipping them off the wheels and onto the customary base plates when preparing to fire.

Science News Letter, February 17, 1945

PSYCHOLOGY

Why Men Marry

Six reasons may be given by men when they tell you why they married or why they want to marry, psychologists tell the returning serviceman.

By Marjorie Van de Water

► "DEAR JANE: Will you be my valentine?"

When GI Joe writes this, the-duration-and-six-months from now, what sort of girl will he pick? And how can he be sure that he will not be getting back from a global war only to start a marital war in his own living room or bedroom? Will his own combat nerves, if he suffers from them, get in the way of his happiness at home?

These and many other questions of interest to the soldier or sailor either when he gets ready to come home or as he reads this year's crop of sweet valentine greetings are discussed in a forthcoming book on "Psychology for the Returning Serviceman," prepared by a large group of scientists and servicemen for the National Research Council and Science Service, and soon to be published by the *Infantry Journal*.

Love, marriage, and happiness in the home are the topics of only a few of the chapters of this book on everyday psychology, which also discusses such personal problems as how to get a suitable job, how to learn new industrial skills, how to get well and build up mental as well as physical health, and how to get along with certain special disabilities that may result from war wounds.

Six Reasons Given

Six reasons may be given by men when they tell you why they married or why they want to marry, the psychologist-authors tell the returning servicemen. Here they are:

Comforts. A man likes good home cooking. He wants a fire to sit beside with his feet up in the evening. He wants the buttons sewed on his shirts.

Sex. A man needs an outlet for the powerful sex drives within him. And it is much better for many reasons to have a legitimate outlet—one that won't get him talked about, one that is safe from disease and other entanglements, one that is respectable.

Pride. A man may marry a good-looking or charming woman in somewhat the same spirit that he picks out a good

car or builds a nice house. He is proud to be seen with her. He gets a thrill out of introducing her to his friends.

Companionship. An unmarried man will have very little chance to share the intimate thoughts of his life, his private troubles and problems, his personal successes. There are lots of jokes about how women gossip, but all the same a wife is sometimes the ideal person to tell things to. And with a good wife a man can enjoy life; they can have good times together. And when troubles come, sharing them with someone close makes the troubles bearable. Such companionship makes life richer.

Social Position. Marriage is important to a man's standing in the community and in the eyes of his employer. Married men are often considered more reliable, more steady as workers than single men. There is good reason for this: A man with a wife and perhaps children dependent upon him is not so likely to take chances as a single man is. He is not so likely to leave a good job and go off somewhere looking for change or adventure. And the fact that a man has assumed the responsibilities of marriage is some evidence that he is a responsible kind of person. In addition, the married man is in a position to entertain his friends and acquaintances in his home, and that is important to social standing.

Love. A man may feel that he wants to marry simply because he has fallen in love.

These are all good reasons for marriage. They are the reasons you may already be aware of. But actually you seek marriage for a great many other reasons that you may know little about because they are deep-hidden reasons that are a part of your nature.

In marriage you find the fulfillment of cravings that you may never have clearly understood. You may know that as a single man you are somewhat restless and discontented. You go around looking for something without ever finding it. You can't seem to "settle down." Maybe you play around with one girl after another, hoping that each one will give you something you need for your

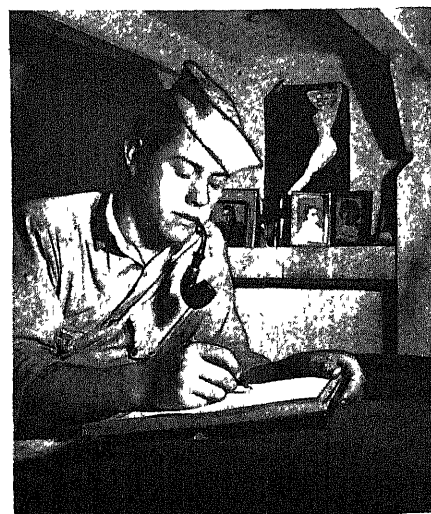
contentment; but none of them do, and so you soon say goodbye. Maybe you try one job after another. Or one town after another.

Then at last you meet the girl and you quit running around. Home is where she is. Your heart is there with her.

What are these cravings? One of them is sex, not just in the narrow sense that you want physical relief; you may have got that outside of marriage. It is sex need in the much broader sense that includes a desire for everything that you have associated with good women ever since you were born. You need some affection, kindness, someone who has a genuine interest in you. You need the care that is like the care a good mother gives, all the warmth of a woman's love. And you need to express your own tender emotions. You need to love.

Men have opposite sides to their natures, equally human. Sometimes you want to tear things up, to rip them apart, to smash and crush and hate. But it is also important for a man to build, to create, to make things grow, to protect and to love. The two drives, although conflicting, are not separate; they are all mixed up together.

War offers many men plenty of chance



WRITING HOME—When he writes to the girl friend, what is he thinking of? Some men think they marry for sex, some for comforts, but all are probably led by things they do not understand. This photograph of a sailor writing aboard a warship was taken by a U. S. Navy photographer.



A MICA MINE

IN A LABORATORY

War shortages crop up in strange materials. Mica, for instance. Once seen principally in the windows of stoves, and in boys' pockets, it is now used extensively as electrical insulation. In some products, it is almost indispensable: capacitors for radio, spark-plugs for airplane engines, insulators in electronic tubes.

With demand mounting, manufacturers were desperate. A four-man technical mission flew to

London to help ration the world's supply between the United States and Great Britain. The shortage was serious.

The War Production Board, convinced that much mica was classified too low when judged by appearance alone, asked Bell Telephone Laboratories to develop a new method of electrical tests. The Laboratories were able to do this quickly and successfully because of their

basic knowledge and experience in this field.

The new tests were made available to manufacturers in this country and abroad — the supply of usable mica was increased 60% — and a difficult situation relieved.

Skill to do this and other war jobs is at hand in Bell Laboratories because, year after year, the Laboratories have been at work for the Bell Telephone System.



BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting for our Armed Forces at war and for continued improvements and economies in telephone service

Do You Know?

Lack of *iron* in early life of swine is the forerunner of many of the infections to which they are subject.

Modern *face powder*, in addition to coloring and perfume, includes substances such as kaolin, talcum, starch, siliceous earth, zinc oxide, zinc stearate, titanium oxide and magnesium oxide.

The *wild cabbage*, a plant of the French invasion coast and other places in the western edge of Europe, is the reputed ancestor of the many forms of cultivated cabbage and kale.

Nearly 20,000,000 *fur-bearing animals* were taken in the United States and Alaska during 1943; the fur catch was worth approximately \$100,000,000 to the trappers.

A *Danish mechanic* made his first solo flight in a stolen German plane and was shot down over Sweden, only slightly injured, where he is now treated as a civilian refugee.

Several hundred American *muskrats*, imported from the United States into Siberia in prewar days, acclimated quickly and their offspring have furnished tens of thousands of skins for Russia in the past few years.

From Page 106

to destroy, to blow things sky high. There is plenty of chance, too, to hate and to kill. There is also building in war—construction of bridges, barracks, machines. But war is mostly a business of destruction. In the service you may have had plenty of chance to be a fighter, but mighty little to be a lover. No man's life is complete without a chance for both

And so soldiers and sailors often go home to "gang plank" weddings and some don't even wait to get home but marry in foreign lands. It is mostly a strong need that impels them, and the reasons that their minds figure out may not be the really important one.

And the need is not one simple urge, but many of them tied together. You need marriage because when you are married you find satisfaction for your tender desires. But you also need marriage because it is permanent—it means the end of running around, of uncertainty and change. You want to strike roots.

And you may want marriage because you have a need to father children whether you ever realized it or not. You want new life to come into being bearing your likeness. That is the only way you can survive beyond your allotted years on this earth. It is your hope for immortality among mortal beings.

Not every soldier and sailor will return home and immediately find the right girl and get married. Some will not be able to marry or, if they do marry, will not be able to find happiness in it. For some a long period of adjustment may be necessary before they can be reasonably sure of being a good husband.

If you happen to be one of these, you won't be alone. There are understandable reasons why war experience should make it harder for some men to find and keep a wife.

Science News Letter, February 17, 1945

AERONAUTICS

Glider Carries 16 Men, Designated as the CG-15A

➤ A GLIDER with a nose that opens like a giant mouth is one of the youngest members of the Army Air Forces family of motorless aircraft. The result of more than three years of research, the new glider has a strongly reinforced nose section, clipped wings, and landing gear with improved shock-absorbers.

Designated as the CG-15A, it will accommodate 16 men, including pilot and

co-pilot, and an alternate two-ton load of rolling mechanized equipment. Design changes increase the useful load of the glider 500 pounds over previous similar models, "up" the towing speed from 150 to 180 miles an hour, and provide better crash protection for the crew.

Built by Waco Aircraft Company, the CG-15A has a high-wing fuselage formed from steel tubing and covered with cotton fabric. The wings and tail surfaces are made of wood. It has a wing spread of more than 62 feet and an overall length of more than 48 feet.

The nose of the new glider is one of its most outstanding features. Sealed with clearvision panels, it affords greater visibility and more convenient controls. Reduction of power required to tow the glider at speeds exceeding 100 miles an hour was made possible by clipping 20 feet from the wing-span of the earlier model, the CG-4A.

The predecessor of the CG-15A, the CG-4A, spearheaded the invasions of Sicily, Normandy, Holland and Burma, and set a pattern of achievement as well as one of construction for the new glider.

Science News Letter, February 17, 1945

Facts ABOUT



VICTORY GARDENS

— — — LISTEN — — —
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Multiple-Purpose Forestry

➤ FORESTERS in this country a generation ago were taught to admire and follow the lead of German foresters, who had been making and caring for forest plantings while we were still in the stage of wasteful exploitation of our own natural timber resources. Men who had visited the carefully cultivated woodlands in the *Vaterland* were loud in their praise of the orchard-like spacing and regularity of arrangement, with trees all of the same kind and age in blocks, so that all would grow up together and be ready for harvest together. They commented favorably on the table-like neatness of the forest floor, swept clear of dead branches, snags, stumps and debris generally. These were held up as models for the young profession of forestry in America.

Even if these practices had been entirely correct (they weren't), they would not have been well adapted to American conditions. That strictly drilled arrangement, with trees like soldiers and the forest floor like the floor of a well-policed barracks, was possible only in a land where plenty of intelligent labor was available, and at relatively low wages, too. The complete sweeping up of dead limbs and other rubbish was due in part to the intense need for domestic fuel in nearby towns—a situation hardly paralleled in the endless wildernesses of our West or in the piney woods of our Southern coastal plain.

But even where achievable, this highly regimented German forestry was not ideal. Having all the trees of the same kind and age over large blocks tended to encourage epidemics of tree diseases and outbreaks of insect pests, that could sweep through the solid blocks without a break. When all the trees in a block

were felled, too much soil surface was left exposed to the weather and consequent erosion, necessitating expenditure of much labor for protection.

There is a definite trend in the later American reforestation programs to mix the plantings, putting clumps of hardwoods in among the spruces and pines. Some authorities even advocate the inclusion of such trees as wild cherry and hawthorn, which foresters used to term "weed trees," because they furnish food for game animals and birds, thereby en-

hancing the recreational value of the forest.

Certainly no progressive forester now would tolerate the completely clean cutting of any timber area, whether natural or planted. Mowing a forest down like a wheat-field is condemned by all hands as bad business; selective cutting is the present-day watchword. And in the succession-growth that follows such cutting, the forest of mixed species and all ages has a very definite advantage.

Science News Letter, February 17, 1945



B&L Altimar f:4 lens in Fairchild (F-56) Aerial Camera.

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RADIO

Radio Station in France Has Washington Hookup

➤ OVER 400,000 words a day are sent out by the Army's super radio station in France, that has direct hookups with London, Washington and the Army's worldwide radio communications system, the War Department states. The multiple-channel 40-kilowatt station, costing an estimated \$2,000,000, was sending and receiving trans-Atlantic messages 25 days after it arrived in France in 1,000 shipping boxes.

The power of this station may be compared to some of the major standard broadcasting stations in the United States. Station KNX in Los Angeles, WBBM in Chicago, WLW in Cincinnati and WABC in New York are all rated 50 kilowatts, and these are among the most powerful broadcasting stations in the country.

Combat-line communications are built around radio. All field units have their own networks. In addition, every tank has a radio, and a certain number of infantrymen from each company are equipped with "walkie-talkie" sets. Because of its elasticity, radio can keep men stitched together into a fighting team in almost any situation.

Many times during the racing pursuit of the Nazis toward Germany, wire could not keep the immediate pace with fast-moving armored columns. The Signal Corps solved the problem by intro-



LAP-SIZE PIANO—Harold B. Rhodes demonstrates his new portable piano, which he invented for bed-patients, to soldier patients at Bolling Field Hospital. In building this instrument with filed tubes instead of strings, he used aluminum tubing from the hydraulic system of wrecked planes and plywood from abandoned engine crates. Eight models have already been built for demonstration at each of the AAF convalescent hospitals in this country.

ducing a system of very high frequency radio relay stations. This system consists of broadcasting stations 25 to 100 miles apart, each beamed on the next, like a chain of elephants hanging onto each other's tails. This system was first tried out in North Africa.

The equipment used is similar to that employed by police scout cars, only more elaborate. It provides four teleprinter circuits for the transmission of printed messages plus three radio-telephone circuits for voice transmission. The actual equipment was developed in the United States and England.

Science News Letter, February 17, 1945

CHEMISTRY

"Bottled Gas" for Use in Combustion Engines

➤ "BOTTLED GAS," now widely sold in cylinders for kitchen purposes in areas beyond the reach of city gas mains, is made available for use in internal combustion engines, both automotive and stationary, through an adapter on which U. S. patent 2,368,680 has been issued to John Riise of Doylestown, Ohio.

This fuel consists of a mixture of

butane, propane and other light hydrocarbons that are gases under ordinary conditions but readily liquefy under pressure. This makes their handling in cylinders easy and economical.

Mr. Riise re-converts the liquid fuel into a gas by warming it in a water-jacketed cylinder around which water from the engine's cooling system circulates. In place of the carburetor he uses a special mixing valve, to add the correct proportion of air.

Science News Letter, February 17, 1945

MATHEMATICS DICTIONARY

Invaluable in reading any book that uses mathematics.

The James Mathematics Dictionary

the only such book now published, provides standard definitions of the terms and phrases from arithmetic through elementary differential equations, the technical terms ordinarily used in the applications of these subjects, and more advanced basic terms. Easy examples, many illustrations and all sorts of formulas are included. The appendix contains tables of weights and measures, a list of mathematical symbols and tables ordinarily used in handbooks.

This dictionary is a great deal more than a collection of definitions. It explains, illustrates and correlates, stressing especially those operations that are hardest to understand. One reader has called it "Ten texts in one." Second printing of Revised Edition, just off the press. Blue fabric binding, for \$3.00, from the Digest Press, Van Nuys, California, or Science News Letter.

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Books of the Week

► APPROXIMATELY 2,000 terms used in machine shops, industry and engineering literature are given in **DICTIONARY OF ENGINEERING AND MACHINE SHOP TERMS** by A. H. Sandy. They are defined in language that is understandable to the ordinary machinist. (Chemical Pub. Co., \$2.75).

Science News Letter, February 17, 1945

► **THE PRINCIPLES** and underlying theory in the field of crystal structure is given in **THEORY OF X-RAY DIFFRACTION IN CRYSTALS** by W. H. Zachariasen. It is a book for advanced students based on lectures given graduate students in an American university (Wiley, \$4).

Science News Letter, February 17, 1945

Just Off the Press

AIDS TO TECHNICAL WRITING—Richard C. Jordan and Marion J. Edwards—*Univ. of Minn.*, 117 p., paper, illus., 50c (Univ. of Minn., Eng'g Exp. Station Bull. no. 21)

AMERIGO VESPUCCI, PILOT MAJOR—Friedrich J. Pohl—*Columbia Univ. Press*, 249 p., illus., \$3.

BOOK REPUBLICATION PROGRAM, List III (Cumulative)—Office of Alien Property Custodian, 102 p., paper, free.

A COMPARATIVE DICTIONARY OF THE TAHITIAN LANGUAGE, Tahitian-English with an English-Tahitian Finding List—Edmund Andrews and Irene D. Andrews—*The Chicago Academy of Sciences*, 253 p., paper, \$5.

CURRENT ABBREVIATIONS—George Earlie Shankle—*H. W. Wilson*, 207 p., \$3.

DICTIONARY OF ENGINEERING AND MACHINE SHOP TERMS—A. H. Sandy—*Chemical Pub. Co.*, 153 p., \$2.75.

ENRICHMENT OF FLOUR AND BREAD, a History of the Movement—Russell M. Wilder and Robert R. Williams—*National Research Council*, 130 p., paper, free (National Research Council, Bull. no. 110).

THE FLORIDA SEMINOLE CAMP—Alexander Spoehr—*Field Museum*, 33 p., paper, illus., 50c (Anthropological Series, Pub. no. 567).

THE HOPI WAY—Laura Thompson and Alice

Joseph—*Univ. of Chicago Press*, 151 p., illus., \$3.

HOW YOU CAN GET A BETTER JOB—Willard K. Lasher and Edward A. Richards—*Am. Tech. Soc.*, 206 p., illus., \$1.50, 2nd ed. An inspirational book on how the worker can improve himself.

MANUAL OF CLINICAL MYCOLOGY—Norman F. Conant and others—*W. B. Saunders*, 348 p., illus., \$3.50.

MEGAFAUNAL ZONES OF THE OLIGOCENE OF NORTHWESTERN WASHINGTON—J. Wyatt Durham—*Univ. of Calif. Press*, 211 p., paper, illus., \$1.50 (Dept. of Geological Sciences, Bull., vol. 27, no. 5).

METHODS IN CLIMATOLOGY—Victor Conrad—*Harvard Univ. Press*, 228 p., illus., \$4

MUMMIES—Richard A. Martin—*Chicago Natural History Museum*, 18 p., paper, illus., 25c (Anthropology Leaflet no. 36).

NEW NORTH AMERICAN FLEAS—Robert Traub—*Field Museum*, 9 p., paper, 10c (Zoological Series, no. 566).

THE NOCTURNAL MAXIMUM OCCURRENCE OF THUNDERSTORMS IN THE MIDWESTERN STATES—Lynn L. Means—*Univ. of Chicago Press*, 38 p., paper, illus., 75c (Dept. of Meteorology, Misc. Report, no. 16).

PEACE IS A PROCESS, Selected Articles from The Rotarian Magazine Charting Postwar Opportunities Created by New Forces in World Affairs—Leland D. Case, ed.—*Rotary International*, 127 p., paper, illus., 25c.

THEORY OF X-RAY DIFFRACTION IN CRYSTALS—William H. Zachariasen—*Wiley*, 255 p., illus., \$4.

WAVES IN THE EASTERLIES AND THE POLAR FRONT IN THE TROPICS—Herbert Riehl—*Univ. of Chicago Press*, 79 p., paper, illus., \$1.25 (Dept. of Meteorology, Misc. Report, no. 17).

WHAT IS VOCATIONAL EDUCATION—George H. Fern—*Am. Tech. Soc.*, 159 p., illus., \$2.50. Of interest principally to teachers

Science News Letter, February 17, 1945

AERONAUTICS

Veteran Mechanical Lung Presented to Inventor

► A MECHANICAL LUNG, or turbosupercharger, that has served on a B-17 Flying Fortress for over 1,000 hours of flying was presented to Dr. Sanford A. Moss, inventor of the turbosupercharger, by the 381st Bombardment Group of the Eighth Air Force in England. The lung has been used on 102 combat missions against German industrial and military targets.

"Although grueling demands of high altitude combat flying wear out the average good turbo in around 500 hours, this turbo apparently is as sound in its 1,004th hour as in its first," stated a report from

an AAF sergeant who had examined the lung in England.

Under the direction of Dr. Moss, the General Electric Company has produced nearly 300,000 turbosuperchargers, making efficient stratosphere operations possible for fighting planes and bombers of the U. S. armed forces.

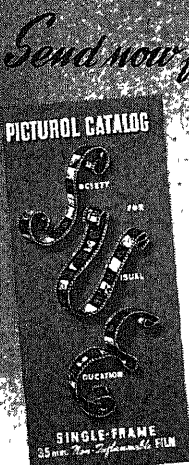
The turbosupercharger is essentially a combination of compressor and gas turbine. In the turbosupercharger, flaming hot gases exhausted from a combustion engine operate a turbine which drives a compressor for supplying air to the engine. The engine thus is enabled to "breathe" normally in the thin air of high altitudes.

As exhaust gases leave an airplane engine at super-hurricane speed and are destructive to ferrous metals, many problems in metallurgy and design engineering had to be overcome before the device would operate successfully. It spins at whirlwind tempo, with the turbine blazing hot at approximately 1,500 degrees Fahrenheit. The compressor, only a few inches away, compresses air as cold as 76 degrees below zero.

Science News Letter, February 17, 1945

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New Machines and Gadgets

⚙️ **TIME-CLOCK** control for radio receivers can be set to interrupt other programs and throw in automatically any desired program at the proper time. It has a frequency pre-selector with an auxiliary condenser which is manually operated to pre-select the station, and clock mechanism to substitute this condenser at the right time.

Science News Letter, February 17, 1945

⚙️ **PLASTIC CLIP**, to hold a pencil in a pocket, and a transparent plastic barrel and magazine to hold extra leads, are held permanently in a single unit by means of a sleeve cemented to the barrel and its cap. The clip is the same material and color as the barrel within which the leads are visible.

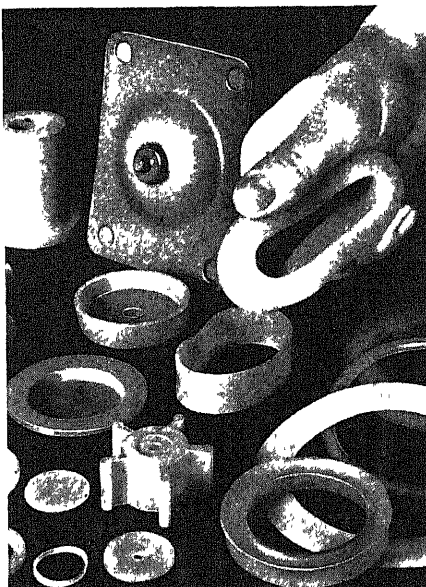
Science News Letter, February 17, 1945

⚙️ **MARBLE DISPENSER**, to be carried on a belt about the body of a marble-shooter to save losses and pocket wear, resembles the coin dispenser used by streetcar conductors. The marbles, inserted in openings in the top, are released singly below when a lever is pressed.

Science News Letter, February 17, 1945

⚙️ **FLATBOAT** operated by an automobile carries the car and is powered by the car's engine. The car is driven onto its flat deck and locked in place with the rear wheels jacked up. Wide flat belts which extend below, over drive wheels on the propeller shaft, are passed over these wheels.

Science News Letter, February 17, 1945



⚙️ **SYNTHETIC RESIN** called compar is replacing rubber in certain washers, seals, gaskets, diaphragms and other flexible articles because of its elasticity, flexibility and abrasion resistance. The articles, as illustrated, are molded of this vinyl resin derivative into various shapes.

Science News Letter, February 17, 1945

⚙️ **COMBINED** compass, protractor and ruler for drafting has flat plastic legs hinged at the top that hold the pin-point and lead. A scale is on one side of the outer edge of one leg, the protractor is on the other side with the lines to measure degrees extending across both legs.

Science News Letter, February 17, 1945

⚙️ **LAWN SWING**, operated without outside aid by leaning backward and forward, has a swinging box with seat suspended at its center on two swinging arms, and a rod extending from its front to the top of one swinging arm. Geared wheels join the rod and arm.

Science News Letter, February 17, 1945

⚙️ **ANTENNA** for automobile radios, adjusted electrically, is a telescoping metal structure that may be projected above the top of the car by means of a small motor at its base and lowered by the same motor. An electric switch within the car, in easy reach of the driver, is turned to the right or left.

Science News Letter, February 17, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D.C., and ask for Gadget Bulletin 246.

BOOKS

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Question Box

CHEMISTRY

What are the new rubberlike plastics used for? p. 105.

What is the latest DDT achievement? p. 102.

ENGINEERING

How may snow be melted on airport runways in the future? p. 105.

How will cheese, ice cream, fresh meat and eggs be brought to soldiers in the Pacific theater? p. 104.

GENETICS

How can colchicine be applied effectively to scores of plants at a time? p. 105.

Do alcoholics inherit their weakness from their parents? p. 102.

MEDICINE

How will beriberi among the rescued prisoners of the Japs be treated? p. 100.

What is needed to complete the effect of penicillin in severe pneumonia cases? p. 104.

Why are the brains of abnormal persons more interesting to science than those of normal ones? p. 99.

NUTRITION

Why do mammals emigrate? p. 99.

ORNITHOLOGY

How are the heartbeats of birds counted? p. 101.

PSYCHOLOGY

What six reasons may be given by men when they tell you why they married or want to marry? p. 106.

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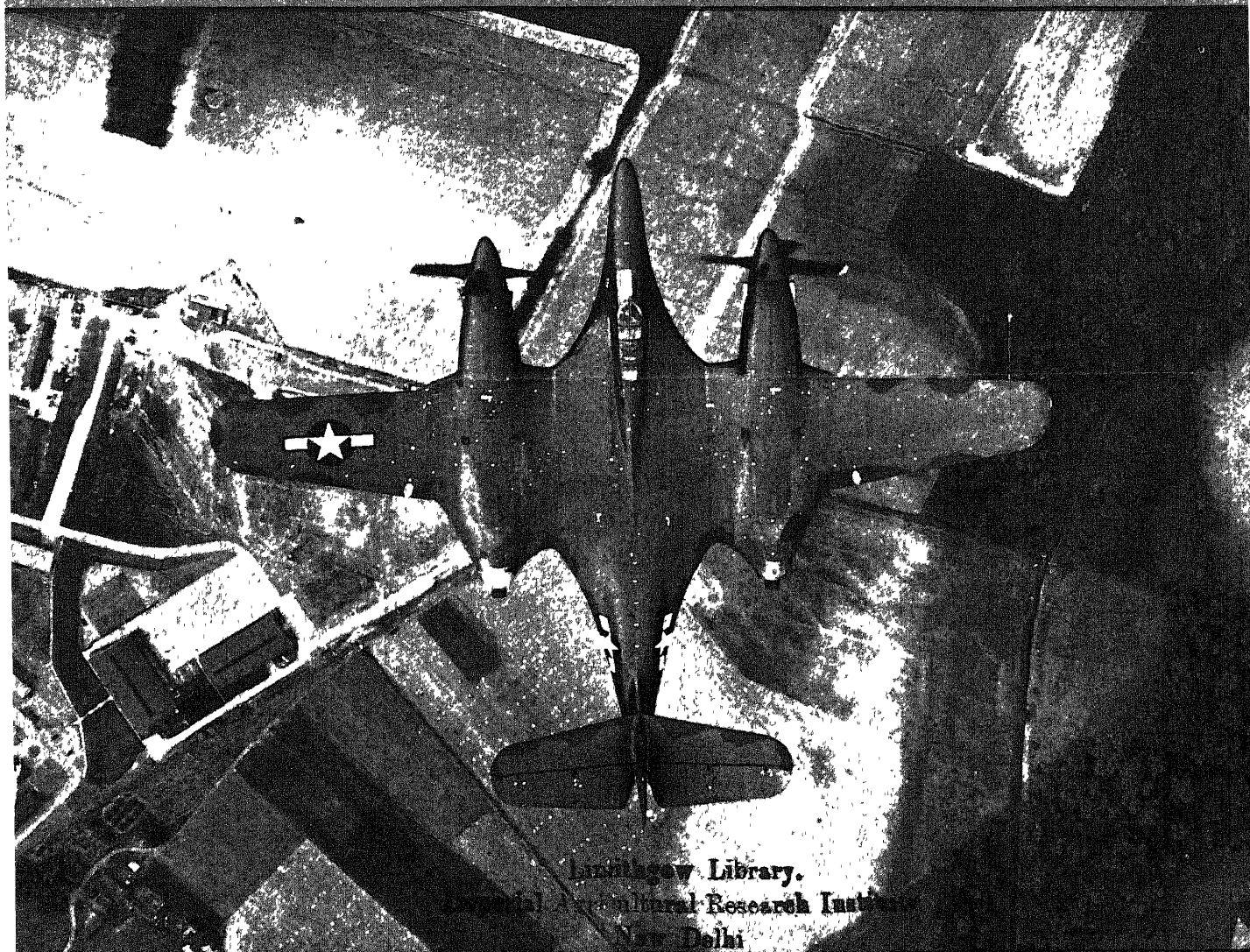
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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 24, 1945



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Special Agricultural Research Institute
New Delhi

Test Plane
See Page 118

A SCIENCE SERVICE PUBLICATION



How Television Got Its Electronic "Eyes"

As revolutionary as airplanes without propellers—that's how much electronic television differs from the earlier mechanical television!

Whirling discs and motors required for mechanical television were not desirable for home receivers. Pictures blurred and flickered.

But now, thanks to RCA research, you will enjoy all-electronic television, free from mechanical restrictions—"movie-clear" television with the same simplicity of operation as your radio receiver.

Such "let's make it better" research goes into everything produced by RCA.

At RCA Laboratories, world-famous scientists and engineers are constantly seeking new and better ways of harnessing the un-

believable forces of nature... for mankind's greater benefit.

Electronic television is but one example of the great forward strides made possible by RCA research—opening the way for who knows what new miracles?

When you buy an RCA radio or phonograph or television set or any RCA product, you get a great satisfaction... enjoy a unique pride of ownership in knowing that you possess the finest instrument of its kind that science has yet achieved.



Dr. V. K. Zworykin, Associate Research Director and E. W. Engstrom, Director of Research at RCA Laboratories, examining the Iconoscope or television "eye"—developed in RCA Laboratories for the all-electronic television system you'll enjoy tomorrow.

RADIO CORPORATION of AMERICA

PIONEERS IN PROGRESS



ENGINEERING

Air Position Indicator

Gives continuous readings of latitude and longitude as the B-29 executes its mission to Tokio. Is first device to give such readings.

► ABOUT the size of a quart milk bottle and mounted on the instrument panel of a B-29 Superfortress, the new air position indicator gives continuous readings of latitude and longitude as the heavy bomber executes its mission to Tokio. This is the first device to give such readings in the history of navigation on the sea or in the air.

Developed by the Eclipse-Pioneer division of Bendix Aviation Corporation, with the cooperation of the Air Technical Service Command at Wright Field and the Navy Department, the device eliminates the need for the navigator to work for hours with charts, basic navigational reference books, star-sighting sextants, and other aids to navigation to calculate the position of his airplane in flight.

The navigator of a B-29 can pinpoint his position on the map and keep the plane on the skyroad to Tokio or any other enemy target, by referring to two needles on a small instrument panel dial of the air position indicator marked off in degrees of longitude and latitude. This same dial also gives him a continuous

record of nautical miles flown and indicates the correct compass heading of the plane.

The API, as the device is known, is also being installed on other heavy bombers and on carrier-based Navy planes. In addition to the help it has given in blasting Japan, it has played an important role in the air-war over Europe.

The API computes the position of the plane in terms of latitude and longitude from physical data, obtained from the measurement of air speed and compass direction, called a "fix" by navigators. It compensates automatically for the earth's curvature, which causes convergence of longitude meridians between the equator and the north and south poles. It is constructed with a system of friction drives, cylinders and disks which delicately integrate all information needed.

With this equipment, the pilot or navigator merely sets his starting latitude and longitude and the proper magnetic variation. Then at any time in flight when he desires to know his air position, he merely reads the dial.

Science News Letter, February 24, 1945

MEDICINE

Five Signs of Death

Severe headaches, dizziness, motor or neurologic disturbances, nosebleeds, and retinal hemorrhages may be signs foretelling death from apoplexy.

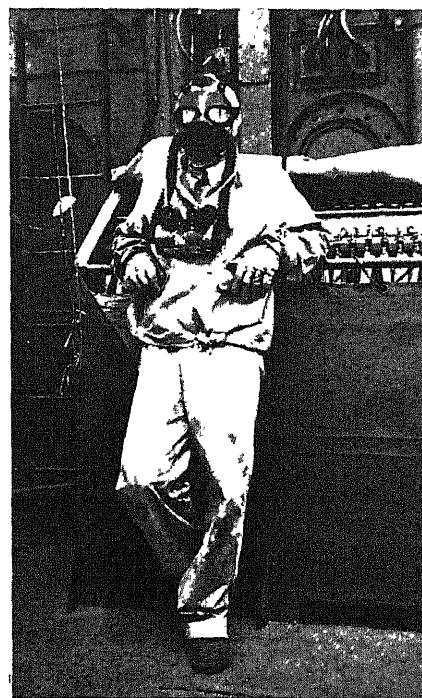
► DEATH from apoplexy can be predicted from five signs or symptoms, Dr. R. D. Taylor and Dr. Irvine H. Page, of the Lilly Laboratory for Clinical Research at Indianapolis City Hospital, report, (*Journal, American Medical Association*, Feb. 17).

If any four of these five signs appear in a person with high blood pressure of the type termed essential hypertension, it may be assumed that the patient will die of apoplexy within eight-tenths of a year to five years or, on the average, within 2.1 years.

The five signs are: severe headaches

at the back of the head or the nape or scruff of the neck; vertigo (dizziness) or fainting spells; motor or sensory neurologic disturbances, such as memory defects, loss of ability to speak, and numbness and tingling; nosebleeds; and retinal hemorrhages without papilledema or exudates which the physician can determine from examining the eyes.

These five signs were observed consistently in 19 patients who died of apoplexy, or cerebral hemorrhage as it is also called. They were absent or negligible in 21 other high blood pressure patients studied who died of other causes



ROCKET GUNNER—Garbed in asbestos and wearing a gas mask, this Navy man is charged with the duty of firing the rockets from a landing craft. He relaxes against the flag bag until the call to action. Official U. S. Navy photograph.

than apoplexy.

If these symptoms prove useful in predicting apoplexy, the way may be open for a search for methods to prevent it, the Indianapolis doctors point out. Such a method of predicting fatal apoplexy also will "offer assurance and comfort" to those with high blood pressure who probably will not die of apoplexy.

Science News Letter, February 24, 1945

AGRICULTURE

Stored Corn in Midwest In Danger of Spoilage

► DURING last autumn and early winter, the U. S. Weather Bureau reminds, it was persistently wet and chilly in the Corn Belt. Immense quantities of corn finally had to be picked and cribbed in unsatisfactory condition, with moisture content too high for long storage.

As long as cold weather lasts, spoilage will not be great, but with warmer weather due soon it is feared that a great deal of corn will be ruined unless it is converted into meat as rapidly as possible.

Science News Letter, February 24, 1945

PHOTOGRAPHY

Aerial Photos at Night

Army Air Force photoreconnaissance pilots are now able to make low-altitude pictures of enemy installations at night without using flash bombs.

► IMAGINE the amount of light that would be forthcoming from 4,000,000 forty-watt bulbs of the type used around your home, and you'll have some idea of the amount of light used by Army Air Force photoreconnaissance pilots to make low-altitude pictures of enemy installations at night without the use of parachute flares or flash bombs.

Secret of the system for taking aerial photos at night is a quartz helix flash tube in which stored electrical energy from the airplane's 24-volt DC electrical system is discharged through the rare gas xenon. Krypton, argon and neon gases may also be used, but xenon gives the whitest light, most desirable for photography.

Flying at 5,000 feet, the new equipment, developed at the Massachusetts Institute of Technology by Dr. Harold Edgerton in cooperation with the Air Technical Service Command, takes 200 pictures in less than seven minutes, on a roll of film 150 feet long.

The unit consists of a K-29 aerial

camera, flash assembly, and a control box. The camera shutter is synchronized with the flash assembly, so that each picture is snapped at the instant the xenon flash bulb reaches its greatest sun-like brilliance. In operation the process is similar to that of taking regular flash pictures, except that the single bulb lasts for several hundred flashes and does not have to be replaced after every picture is taken.

The xenon bulb fits in a large reflector, 30 inches in diameter and 24 inches deep, made of spun aluminum, treated to produce a mirror-like finish.

The camera unit weighs 460 pounds and is suspended from a bomb-rack, so that it can be quickly dropped in case of emergency. It is waterproofed to permit use in the humid tropics. It will also perform efficiently in desert areas or arctic regions.

The remote control box can be set anywhere in the plane, so that the pilot, bombardier, or any crew member can snap the pictures, at the rate of one every few seconds.

Science News Letter, February 24, 1945

part of the district," reported Mr. Espenshade. "Drilling and underground mining to depths of nearly 200 feet below the surface have shown that there is practically no change in the character of the veins or the content of the ores. It seems reasonable to expect the veins to continue to greater depths."

Science News Letter, February 24, 1945

New tracer shotshells, used only in training airplane gunners, have within them a small metal capsule containing a tracer composition which, burning in flight, is visible in daylight.

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GEOLOGY

More Tungsten

► TUNGSTEN worth over \$300,000 has been taken since its discovery in 1942 from the first commercially workable source of tungsten found in the southeastern states, Gilbert H. Espenshade of the Geological Survey, U. S. Department of the Interior, told members of the Geological Society of Washington.

Although tungsten-bearing minerals are known to occur in a number of places in the eastern United States, and a few of these deposits in New England and the Maritime Provinces of Canada have been economically important in the past, most of the new discoveries stimulated by the war need for increased domestic supplies of tungsten have been in our western states, Mr. Espenshade stated.

The economically important deposits were discovered in eastern North Carolina and Virginia by two brothers, Joseph

and Richard Hamme, in Vance County, N. C., and Mecklenberg County, Va., about three and a half miles northwest of the village of Townsville, N. C.

The region has been examined and mapped by geologists of the Geological Survey in conjunction with the Bureau of Mines of the U. S. Department of the Interior. The deposits were found to occur as a series of veins in a belt about eight miles long and a mile wide.

Most of the tungsten-bearing quartz veins lie in granite, within 1,500 feet east of the point where the discovery was made. A series of short veins, each several hundred feet long, occur in a narrow zone of granite. West of this are larger veins, ranging in thickness from a foot to 30 feet and having a maximum length of 1,500 feet.

"The richest veins are in a zone about two and a half miles long in the central

PSYCHIATRY

Returning Soldier Problem

The man who has adjusted well to military life will have more trouble than the NP in fitting back into civilian life, psychiatrist says.

► **HELPING** the returned soldier to fit back into his place in civilian life requires a teaming up of physicians with statesmen, sociologists, psychologists, industrialists and, in fact, society as a whole. Everyone must cooperate to make the effort a success, Dr. William Malamud, director of clinical psychiatry at Worcester State Hospital, told a meeting of the American Academy of Arts and Sciences in Boston.

Dr. Malamud is working with the research staff at Worcester in an investigation of the reconditioning and civilian readjustment of men who are psychiatric military casualties.

But it is not the NP casualty, the man

whose mind or whose nerves have been upset by military service, who is going to have the greatest difficulty in fitting back into the life of his community when he leaves the Army, Dr. Malamud told the meeting. Such casualties often occur in men who were not able to make the adjustment satisfactorily to military life. If they can be cured of their illness, and most of them can be cured readily, they should not have much difficulty in fitting back into the old pattern of civilian life.

"It is the soldier who has made a particularly good adjustment to military life," Dr. Malamud declared, "who will have the difficulty in readjusting himself to the community to which he returns."

Study of the NP's, however, and the reasons for their difficulty in adjusting to military life, as well as study of those who have nervous difficulties when they get home, may throw light on the problems faced by the well-adjusted soldier who must make a new readjustment after his separation from the service.

One veteran who came to Dr. Malamud's clinic had seen three years' overseas service in the Pacific. He needed help because on his civilian job he suffered marked restlessness, inability to concentrate on his work, jumpiness, vague pains, loss of weight and appetite and generally irritable and resentful attitude towards both employers and co-workers.

He had gone back to his old job, hoping to do the same kind of work he had done before he went into the Army at 18. But now he was 22 and still shaky from long hospitalization. Having lost about four years of work, he found that others who had stayed on the job were advanced to higher job levels. One of the boys he had started out with, and who had been rejected for service because of a physical defect, was now foreman.

The veteran was particularly resentful of this foreman, and any little criticism from him produced outbursts of anger and irritability and made the chest pains worse.

The solution was in a thorough physical examination which showed that the many physical symptoms were caused by emotional difficulties, and in transfer to another factory where the possibility for further education and training for a better job with new associates was assured. In the new job he was able to take advantage of what he had learned in his years of service and turn them into an asset rather than a loss.

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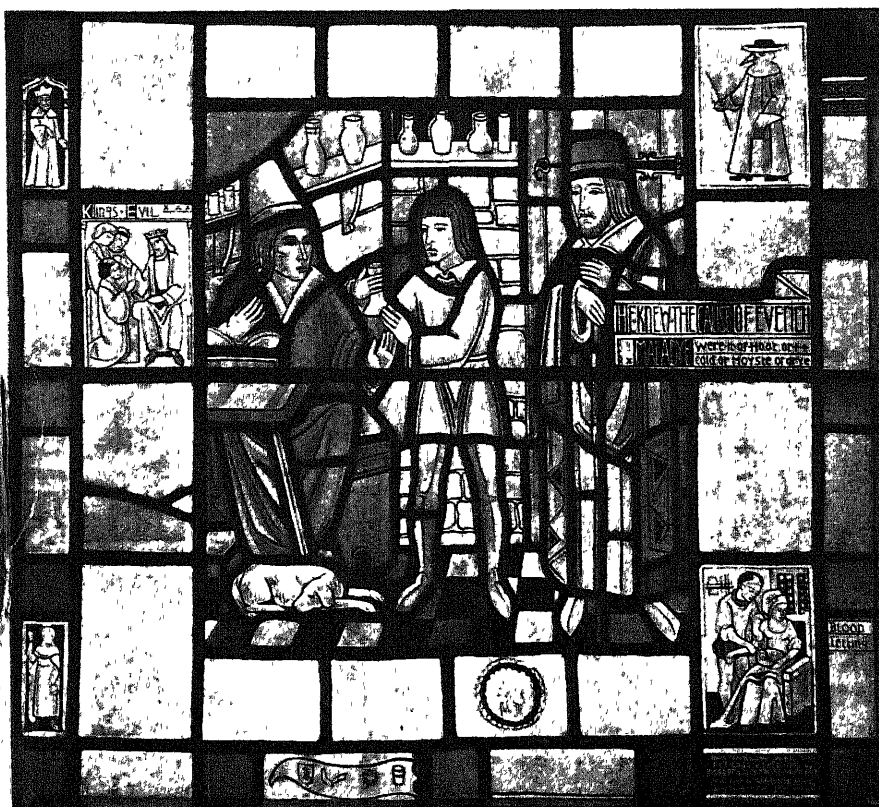
CHEMISTRY

Wax Heels and Toes for Longer Stocking Wear

► **RUBBING** a piece of candle wax or paraffin on the heels and toes of stockings before each wearing makes them last four times as long before holes appear, report textile specialists of the U. S. Department of Agriculture.

Laboratory tests show that a thin film of wax on stocking feet, routine treatment used long ago in wooden-shoe lands of Europe, will not interfere with the proper laundering of the stockings or change their appearance.

Science News Letter, February 24, 1945



MEDIEVAL PHYSICIAN—This panel of the east window in the Mayo Foundation House, shows the interior of the office of a medieval physician. The window is divided into three sections, representing the history of medical practice, the history of medical education, and the history of medical research. This photograph is reproduced from the Bulletin of The Medical Library Association, by Maj. Thomas E. Keys and Dr. Donald C. Balfour.

AERONAUTICS

Six New Planes

The Axis will never see the XP-55 "Ascender" or the XP-77, but these planes will make important contributions to future warplane development.

See Front Cover

➤ SIX PLANES that the Axis will never see have been stripped of a cloak of secrecy by the Air Technical Service Command. Although these queer-looking planes will never see combat they are now winged classrooms that will make important contributions to future warplane development.

Looking something like a modified flying wing or possibly a vulture in flight, the Curtiss-Wright XP-55 "Ascender" is a pusher-type plane with an Allison "1710" engine mounted in the extreme rear, and with heavy forward-firing guns in the nose to balance the weight of the engine. The pilot is sandwiched in the fuselage between the guns and the engine.

This pusher plane does not have the conventional rudder. In its place it has vertical stabilizers, like the flippers of an Arctic seal, near the tips of its swept-back wing to aid directional control. The XP-55 has two elevator controls in the extreme nose, which stick out like small wings.

Next on the list is the XP-77, the only all-wood fighter developed thus far in World War II, and built by Bell Aircraft. This plane was designed when the metal shortage loomed critical, as an alternative. It has a hollow-propeller shaft, like the Airacobra, to permit the use of a single forward-firing cannon.

This single-seater plane used a small two-bladed metal propeller with a spinner hub. Speedy and highly maneuverable, it was designed for possible use against the fast-flying, sharp-turning Jap Zeros. The main difficulty seems to be that the nose wheels are always coming off in landings. However, with this fault rectified, it might be developed into a highly satisfactory trainer plane. It certainly bears watching.

Flying Elephant might be a good nickname for the XP-56, a test-tube airplane developed by Northrop. With a stubby fuselage extending into an engine nacelle, this early attempt at the flying wing looks for all the world like a baby elephant flying with the aid of its big

ears. Large fixed vertical fins above and below the fuselage give the "Dumbo" a sausage-like appearance when viewed from one angle. Two three-bladed counter-rotating pusher propellers mounted on the same shaft are powered by a radial engine. The weight of the engine is concentrated in the wing's mid-section.

The XP-75, intended as a composite airplane and designed by Douglas Aircraft, was to use assembly parts already in production for other airplanes. It has P-40 "Warhawk" wings, P-51 North American fuselage, F4U landing gear, and a Douglas A-24 tail. The finished product is a completely new design, long and slender, with very thin wings and a peculiar rudder shape. A 3000-horsepower Allison engine drives the two three-bladed coaxial counter-rotating props.

McDonnell Aircraft of St. Louis designed the XP-67, a single-seat interceptor plane built for a battery of fixed can-

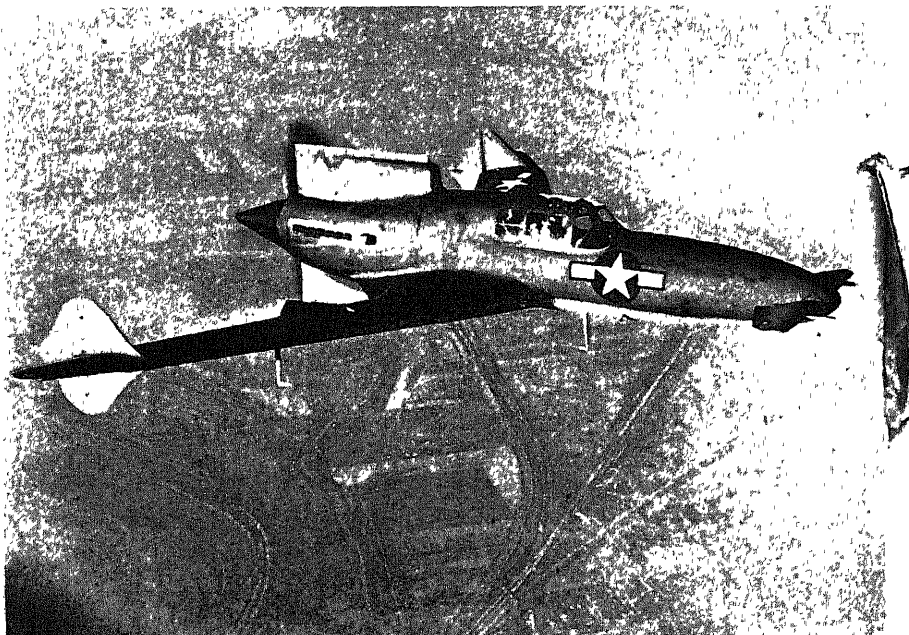
non. This plane has a nacelle design that permits a certain amount of forward thrust from a jet of exhaust gases.

The twin-boomed, bullet-shaped XP-54, designed by Bell Aircraft, looks something like a P-38, but is a pusher plane, with an extremely low-drag wing. It is one of the first aircraft to have a flush-riveted skin that gives it the same smooth appearance as the fender of a car. Called the "Swoose Goose," because of its inverted gull wings, the plane has a four-bladed prop driven by a Lycoming inline engine.

First pictures of these unusual-looking aircraft were published in *Air Force*, the official publication of the Army Air Forces. The release of this information is the first step on the part of the AAF to fill in existing gaps with descriptions of experimental planes which have provided much of the valuable knowledge needed to keep American aviation ahead in the war. The picture of the XP-67 shown on the front cover of this SCIENCE NEWS LETTER was taken by an Army Air Forces photographer.

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Meat production in Canada in 1944 exceeded all previous records, meat slaughtered in government inspected packing houses is 20% greater than in 1943.



"ASCENDER"—This XP-55, a cross between a flying bomb and a long-necked goose, flies better than it looks. Tailless, its elevator controls are in the nose, and the rudder control is on the sweptback wing tips. Powered by the Allison 1710 engine, from the ground the plane appears to be flying backwards. Official U. S. Army Air Forces photograph.

CHEMISTRY

"Stink Bomb" for Sharks

The repellent forms an inky black cloud when it is dissolved in water, causing sharks to turn tail and swim away from downed flyers.

➤ A NEW "stink bomb" for sharks chases them away from Army Air Force flyers downed in shark-infested waters. The new chemical weapon is obnoxious to the olfactory sense of sharks, keeping them away from flyers who use it. Dissolved in water, the repellent forms an inky black cloud that is almost odorless to humans, but to sharks it smells like decaying sharks' bodies, causing them to turn tail and swim off.

This effective deterrent to the toothed terrors of the deep is the product of several months' research which has resulted in the combining of a substance extracted from sharks' bodies and formed into a chemical salt, with a black dye that is so effective that it serves as a deterrent by itself. The dyes and chemical salt are pressed into a black cake, and packaged in a water-proof envelope which is attached to life vests. Downed flyers release the repellent into the water by ripping open the envelope tab.

Shark attacks on humans are rare, since man is not a shark's natural prey. The sight and smell of blood, however, doubles the danger to wounded flyers ditched in tropical waters. Comparatively rare though they are, shark attacks on humans are fatal in 80% of the cases.

Developed primarily by the Air Technical Service Command to remove an incidental terror of war from the minds of American flyers, the history of the new repellent is a good illustration of the cooperation between the military, scientists, and industrial researchers. The ATSC engaged as consultant Dr. W. D. Burden, of the American Museum of Natural History, who had worked on a similar project at the Woods Hole (Mass.) Oceanographic Institute under the Office of Scientific Research and Development. In the search for an effective repellent many substances were tried, with little success, until a study of fisherman's lore revealed that sharks do not venture into waters polluted by decaying bodies of their own kind.

Later the Calco Chemical Company, in cooperation with the Naval Research Laboratory of the Bureau of Ships, developed the black dye.

In open sea tests off the coast of South America and Florida, fish were thrown overboard from shrimp boats to attract sharks. The sharks struck in large numbers until the repellent was released into the sea. Then they dispersed and refused to venture back even after the repellent had become greatly diluted.

Convinced of the value of the shark chaser, the Army Air Forces is producing large quantities of shark-repellent packets.

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AERONAUTICS

Iowa Farmer Develops Catapult Pick-Up System

➤ TOWNS WITH a small population may benefit after the war from a catapult pickup device developed by a Midwestern farmer, Louis P. Wulf of Lost Nation, Iowa, that permits planes to swoop down, pick up air mail and express and continue on their flight without a stop (*American Aviation*, Jan. 1).

The device consists of a 40-foot tower on which is installed a cannon-like catapult. In operation, the parcel of mail or express to be picked up is placed in the cylinder of the cannon, and the device loaded with a cartridge which resembles a blank shotgun shell. At the top of the tower is a device that detonates the explosive charge when the trailing cable from the bottom of the plane passes through a slot, guided there by wires extending from two uprights on the approach side of the tower.

The explosion shoots the air-mail parcel at a speed synchronized with the ground speed of the aircraft. One or more cartridges may be used, depending on the weight of the package. The parcel hooks onto the trailing cable of the plane, which is raised to the aircraft by means of a small windlass operated through a door in the bottom of the fuselage.

An application has been made to the Civil Aeronautics Board by a company organized by Mr. Wulf for the operation of two pickup routes from Moline, Ill., across Iowa, to Omaha, Nebr., with pickup installations, costing about \$250

each, established at 70 towns on the routes. Plans made now involve the use of single-engine planes flying at a speed of about 110 miles an hour.

Handlers at each station will be equipped with short-wave walkie-talkie radios to contact ships several miles away and advise the plane of the weight of the parcel to be picked up. These handlers will also transport mail and express to the catapult and return with incoming parcels for delivery in the community.

While daylight operations are planned at the outset the report states that experimental night flights will be tried out, using neon lights to identify the towers from the air. The advantage of night operation lies in the fact that about 85% of the daily air mail is posted at the close of the day's business.

Science News Letter, February 24, 1945

MEDICINE

Penicillin Pills May Replace Injection Method

➤ PATIENTS taking penicillin in future may swallow the drug in a pill, or rather a gelatin capsule, instead of getting it by hypodermic injection, it appears from studies reported by Dr. Raymond H. Libby, of the American Cyanamid Company's research laboratories (*Science*, Feb. 16).

It has not heretofore been possible to give the mold chemical by mouth because its activity is so rapidly destroyed by the acid in the stomach. Dr. Libby reports he has overcome this difficulty.

Sodium or calcium salts of penicillin are suspended in cottonseed oil and then put into gelatin capsules. The gelatin capsule protects the penicillin from the stomach acid. The penicillin then becomes available through absorption into the blood from the small intestine.

Tests with animals and patients showed that the capsule method of giving penicillin is effective in keeping adequate concentrations of the drug in the blood for action against invading disease germs.

More penicillin apparently must be used but this, Dr. Libby suggests, will probably be offset by several factors. One is the greater ease, for both doctor and patient, of giving the drug by mouth instead of by injection. Another is that less highly refined penicillin should be satisfactory. This would simplify production procedures.

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MEDICINE

24-Hour Recoveries From Severe Strep Throat

► PATIENTS with severe streptococcus sore throats start to improve within eight to 12 hours after the first injection of penicillin and are, as a rule, well within 24 hours, a group of Army medical officers found in studies reported in the *Journal, American Medical Association*, (Feb. 17).

Unless the patients continued to get penicillin treatment for six days, however, they suffered relapses.

The greater effectiveness of penicillin over sulfadiazine in throat infections with hemolytic streptococci is stressed in the report by Maj. Norman Plummer, Miss Dorothy Rhoades Duerschner, Maj. Harold Draper Warren, Capt. Francis T. Rogliano and Capt. Ruell A. Sloan.

"It should be used without delay in any serious, progressive hemolytic streptococci infection," they advise.

The most striking finding, they point out, was the disappearance of the streptococci from the nasopharynx within 24 hours. This raises a number of questions such as whether it is possible completely to eradicate the streptococci from the body and what effect this would have on the course of the disease and the development of rheumatic fever or kidney disease as complications of strep sore throat. The study does not answer these questions though it gave "some indication that complications of this disease can be prevented and effectively treated."

Science News Letter, February 24, 1945

INVENTION

Curved Knife Developed To Slit Clothing

► ARMY Air Force bombers overseas are now being equipped with a new kind of knife, specially developed to slit clothing, so that aircrews can quickly reach and treat wounds while the plane is still in combat.

Developed by the Aero Medical Laboratory at Wright Field, the new knife looks like a spoon with a short handle and the bowl flattened out, with the edges sharpened. Carried conveniently inside the plane in a leather sheath, the knife is attached to a string, so that it cannot easily be lost.

In case of an accident, the knife can be used to slit through the heaviest clothing, several layers at a time, without cutting into the wearer's body, a danger

when other types of knives are used. With the wound thus quickly exposed, treatment can be quickly given.

It is probable that these knives will become standard equipment for hospitals and ambulances, as well as police rescue squads, when getting at the wounds of a man in an accident may mean the difference between life and death.

Science News Letter, February 24, 1945

ENGINEERING

Batteries in Aircraft Protected Against Leaks

► CORROSIVE ACIDS from electric batteries cannot spill out and cause battery failure or damage to the plane on batteries equipped with a new valve vent. In combat flying, pilots frequently have to turn their planes upside down, causing battery acids to spill out.

The new valve vent, developed by the Auto-Lite Battery Corporation, seals the cells of the batteries in military aircraft when the plane is in any position but normal, as in a steep bank or upside-down flying. At the same time, it allows for perfect functioning by automatically opening the instant the plane returns to normal position.

Hydrogen and oxygen gases that accumulate while the battery is charging are thus allowed to exhaust without loss of vital battery acid.

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AERONAUTICS

New British Spitfire Is Fastest in Its Class

► THE SPITFIRE XIV, newest fighter plane of the Royal Air Force, is also the fastest Spitfire in service, attaining a speed of 450 miles an hour over a tactical range of 300 miles. This means that it can fly 300 miles from its base and still have enough gas left to return home.

Equipped with a five-bladed propeller and a 2,000 horsepower Rolls Royce Griffon engine, the plane has been in operation with the R.A.F. since D-Day last June. Only two American planes in the fighter class are equipped with engines of 2,000 horsepower. They are the P-47 Thunderbolt and the P-61 Black Widow.

One Spitfire pilot is reported to have shot down three German fighters in five minutes.

The high speed of the plane does not affect its maneuverability, according to the report from the British Information Services.

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AERONAUTICS

Helicopters Will Have Two Intermeshing Rotors

► THE AIR Technical Service Command is running tests of a new helicopter which at present looks like a jelly-fish with a windmill over its head. It has two rotors that rest in the same plane and intermesh with each other like gears.

Other recent developments in helicopters include an improved oil-cooling system for the XR-6 helicopter, all-metal rotor blades to replace wooden blades now used, and an automatic pitch reduction system. This mechanism operates in response to engine speeds, the pitch of the rotor blades being decreased when the engine drops below a predetermined speed.

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PLANT PHYSIOLOGY

Cooling Tomato Plants Boosts Fruit Production

► TOMATO PLANTS can be induced to produce most heavily by cooling them off in the afternoon, after their leaves have put in a good morning's work making foodstuffs with the aid of sunlight. This has been revealed by experiments at the California Institute of Technology reported by Prof. F. W. Went (*Science*, Jan. 26).

Many plants are stimulated to produce flowers and set fruit by changing the length of their daily exposure to light. Tomatoes are indifferent to length of day changes in light, Prof. Went states, but daily fluctuations in temperature affect them profoundly, no matter what the lighting conditions are. He also knew that so far as food-forming activity is concerned, the tomato plant's working day ends at about two o'clock in the afternoon, solar time.

Prof. Went put tar-paper covers over tomato plants grown outdoors in the California winter, starting after their day's food-forming work was done and keeping the covers on until the following morning. Plants thus treated formed and ripened good crops of tomatoes, while plants left uncovered as controls remained unproductive.

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FIELDS

MEDICINE

Penicillin Tried as Undulant Fever Treatment

➤ A REPORT of a trial of penicillin in undulant fever has appeared in the *Journal of the American Medical Association*, (Feb. 10). The report was made by Drs. Carl G. Harford, Samuel P. Martin, Paul O. Hageman and W. Barry Wood, Jr., of St. Louis, and covered the use of penicillin in a number of other illnesses. The undulant fever case was that of a 20-year-old butcher in a large packing house in St. Louis. He was treated intensively for a week with penicillin without improvement. His fever continued and the germs continued in his blood.

"Too much significance should not be attached to this one case report," the doctors, however, point out.

Different strains of brucella, the germs that cause undulant fever, are known to vary in sensitivity to penicillin. Dr. Tsun T'ung, working at the Johns Hopkins School of Hygiene, found that eight out of 15 strains were susceptible to penicillin in test tube experiments and that addition of sulfathiazole enhanced the effect of penicillin.

It may be that the mold chemical will be effective in some cases and not in others, depending on the strain of germs that are causing the sickness. The question of whether or not to try penicillin is, of course, one for the patient's doctor to decide.

The layman should remember that while packing house employees, butchers, veterinarians and farmers may get the disease from infected animals or carcasses, it is usually contracted from drinking infected, raw goat's or cow's milk. Pasteurization of the milk is the safeguard against this source of the disease.

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METALLURGY

Extremely Hard Tool Steel Made by New Method

➤ HARDER tool steels for faster production of the wares of war and more efficient reconversion to the works of peace, are promised in a new U. S. patent, No. 2,369,211, issued to F. H. Clark of New York City and R. F. Dirkes of Jamaica, N. Y.

Their process is a variant of the now familiar sintering method, wherein metallic powders are molded into the desired form and then heated until they become solid. The Clark-Dirkes steels are made by mixing into powdered iron or steel an excess of powdered carbides of tungsten, vanadium or other hardening alloy metal. When the sintering heat is applied, part of the hardening material blends with the iron, and the rest of the diamond-like particles remain unchanged, firmly embedded and bonded into the mass of the steel.

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CHEMISTRY

Undersea Electric Cables May Use Polythene Plastic

➤ UNDERSEA electric cables may, in future days, be insulated with polythene plastic, it is predicted, because this material has excellent insulating qualities, is not attacked by seawater, resists penetration by moisture, and is unusually insoluble and inert to chemical reagents. It may be used also for protective coatings on machinery in or near salt water, to prevent corrosion.

This prediction was made by Dr. J. W. Shackleton of the plastics department of E. I. du Pont de Nemours and Company, at a meeting of the American Institute of Electrical Engineers.

"Polythene has very largely replaced all other materials in the insulation of military wires for high-frequency use," he said. "After the war it is expected that the use of polythene in electrical equipment will continue and expand, and that further varieties and modifications of it will be developed to meet specific needs."

Its good resistance to chemicals points to its utility in chemical equipment as a coating and gasketing material, the speaker continued. Its impermeability to moisture indicates a broad utility in containers and the packaging of foods. It is substantially unaffected at room temperature by concentrated hydrochloric, sulfuric, and even hydrofluoric acids, while nitric acid has no visible effect but does ultimately impair tensile strength and elongation.

Polythene, Dr. Shackleton explained, is the generic name applied by Imperial Chemical Industries, Ltd., who originally developed the material, and adopted by the Du Pont company to designate the "giant molecule" forms of ethylene suitable for use in plastics.

Science News Letter, February 24, 1945

AERONAUTICS

Prefabricated Servicing Shelter for Bombers

➤ A PREFABRICATED servicing shelter in which Liberator bombers and several other types of aircraft can be serviced has been developed for use where permanent hangars or docks are not available. The structure, designed by Consolidated Vultee Aircraft Corporation, provides shelter for both ground crews and vital parts of the airplane itself, thus making possible more efficient work than when it is necessary to service aircraft in the open.

The side third section of the dock is curtained off. The curtains are raised to receive the front half of the airplane, then are drawn around the plane to make possible the servicing of the aircraft no matter what the weather outside. While its appearance does not suggest great strength, it is planned for use in all weather conditions and it is reported to be able to withstand winds of hurricane velocity, around 70 miles an hour.

The complete dock is prefabricated ready for shipping to any part of the world and is so designed that eight men can set up the building in 72 hours.

Science News Letter, February 24, 1945

ORDNANCE

Self-Propelled Gun Has 360-Degree Traverse

➤ A NEW high-speed, highly agile self-propelled mounting for Bofors anti-aircraft cannon and similar light artillery has been designed by Horace D. Stevens of Akron. His patent, No. 2,367,837, is assigned to the Firestone Tire and Rubber Company.

The gun is mounted on a turntable which gives it a 360-degree traverse. It is carried on the bed of a truck or, preferably, a half-track vehicle to give it greater cross-country maneuverability. In march order, the muzzle of the gun projects forward through a notch in the windshield, and the crew are protected by walls of light bullet- and splinter-proof armor. In action, these fold downward, giving utmost freedom of action.

When it stops for firing, the vehicle is lifted on jacks and braced by outriggers, for greater steadiness. Chutes are provided through the floor, to get the empty cartridge cases from under foot and to drop them clear of the half-track mechanism.

Science News Letter, February 24, 1945

ASTRONOMY

Mercury in Evening Sky

Mercury, Venus, Jupiter and Saturn are all visible at once at the end of March, but this will require very clear skies down to the horizon.

By JAMES STOKLEY

► IN THE FALL of 1939 we had the privilege of seeing all five naked-eye planets—Mercury, Venus, Mars, Jupiter and Saturn—lined up in a row in the western evening sky. Such a display will not come again for a long time, but at the end of March four of these planets, that is, all except Mars, will be in the sky at the same time. Mercury is the most rarely seen of all these five, since it never appears except low in the east just before sunrise or low in the west just after sunset. On March 26 it reaches the latter position, called "greatest eastern elongation." Then it will be in the constellation of Pisces, the fishes, and will set nearly two hours after the sun. Thus, as the twilight is gathering around the 26th you may look to the west, and if you see a bright "star" it will be Mercury, for no other object in that direction is likely to be mistaken for it.

Since the accompanying maps are prepared for somewhat later in the evening—11:00 p. m. March 1, 10:00 p. m. on the 15th and 9:00 p. m., war time, on the 31st, Mercury is not indicated on them, for Pisces will have set. However, there are three other planets which are shown. There is Venus, brightest of all, at its greatest brilliance, toward which it has been brightening for many months. It is in the west in the constellation of Aries, the ram, and on March 10, when it attains maximum brightness, will be of magnitude minus 4.3 on the astronomical scale.

Saturn Is Next

Swinging toward the south the next planet we come to is Saturn, which is in Gemini, the twins, close to the stars that mark the foot of Castor, one of these boys. Its magnitude is 0.2, which makes it brighter than any star except Sirius, the dog star, which is below it.

Toward the east is Jupiter, in the figure of Leo, the lion, near the star marking the beast's hind foot. On March 13 Jupiter is at opposition which means that it is directly opposite the sun, so it rises as the sun sets. Therefore, when Mercury

makes its appearance around the 26th, it will be possible, though perhaps not easy, to see Jupiter before Mercury has disappeared, and this will put four naked eye planets into the sky at once. This will, however, require very clear skies down to the horizon both in the east and west, and that condition may be hard to find.

When Jupiter is in opposition, as in March, the earth is on the same side of the sun as the planet, so that we are closest, and that planet is brightest. Jupiter's magnitude is minus 2, brighter than any other except Venus. Its distance on the 13th is 412,200,000 miles.

Mars Is Not Visible

Mars, the remaining planet, is not visible these evenings. It is very close to the sun and rises a short time before sunrise. Because it is now far on the other side of the sun, it is very faint, and hard to see. But there is another planet in the evening sky, one that this month is also at opposition and at the greatest brightness; not enough, however, to make it visible to the naked eye. This is Neptune, which is in Virgo, below Jupiter. Opposition is on March 25 when the distance is 2,720,000,000 miles.

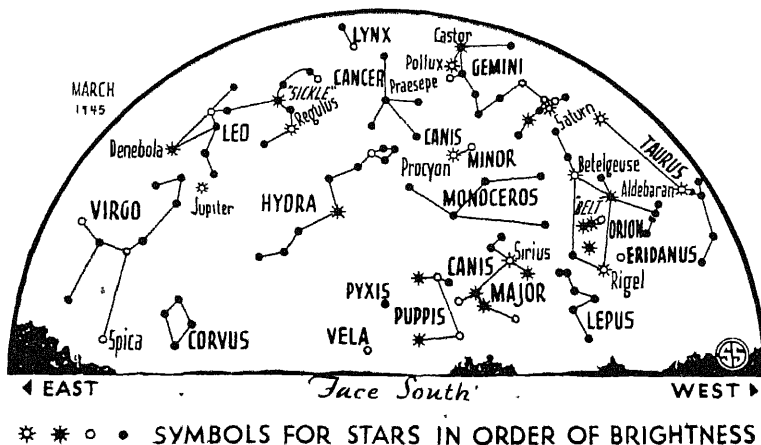
The chief stars to look for this month are those in the southwest in and around the constellation of Orion. In Orion itself are two first magnitude stars—Betelgeuse, above, and Rigel, below. Above Orion are Gemini, the twins, in

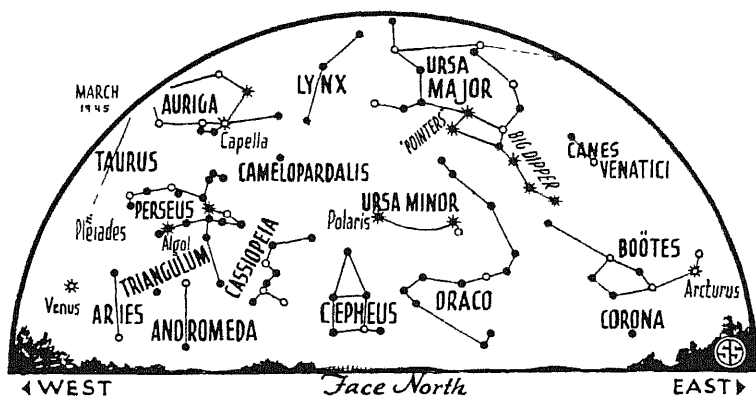
which Saturn stands, and with first magnitude Pollux. Below Pollux is Procyon, in Canis Minor, the lesser dog. Still nearer the horizon is the great dog, Canis Major, with Sirius. Taurus, the bull, is in the west, with brilliant Aldebaran. Next to Taurus is Auriga, the charioteer, with Capella, another of the first magnitude.

Coming up in the east are some other first magnitude stars. There is Regulus, in Leo, the lion. Below is Spica, in Virgo, the virgin, though this star is so low that it does not appear at full brilliance. A little farther north is Arcturus, in Bootes, the bear-driver.

Mercury, which makes its most favorable appearance of the year in March, is the closest of the planets to the sun. Instead of the 93,000,000 miles separating the sun from us, Mercury is only 36,000,000 miles from the center of the solar system, and thus it gets far more heat in the form of radiation from the sun. Its diameter is only 3,010 miles, and it turns on its axis once in 88 days, the time that it requires to revolve around the sun. That means that it always keeps practically the same hemisphere toward the sun, just as the moon does toward the earth. One half of Mercury, therefore, is probably very hot, with the temperature high enough to melt lead, while the opposite half, where the sun never shines, is very cold.

On Mercury there seems little possibility of any atmosphere which might ameliorate this condition to some extent. For every planet there is a speed, called the velocity of escape, at which an object can be projected to overcome completely the gravitational attraction. At





the surface of the earth it is about seven miles per second, but for Mercury, it is only 2.2 miles per second.

Now this speed applies to any object, whether it is as big as a house—or a rocket ship—or a single tiny molecule. Our atmosphere consists of molecules of nitrogen and oxygen, which are in constant movement, but the average velocity is considerably less than seven miles per second. Only occasionally will an air molecule at the top of the atmosphere move fast enough to leave the earth completely, and join the stray molecules moving around in space.

On Mercury, however, the speed of movement of such molecules would be greater, because of the higher temperature. Thus, if Mercury were by some miracle to be suddenly endowed with an

atmosphere like ours, it would soon lose it. In view of this, Mercury seems quite unsuitable as the possible abode of life.

Celestial Time Table for March

Mar	EWI	
2	3:00 a. m.	Moon farthest, 252,200 miles.
7	12:30 a. m.	Moon in last quarter.
10	4:00 a. m.	Venus greatest brilliance.
13	8:00 a. m.	Jupiter nearest, distance 412,200,000 mi.
	11:51 p. m.	New moon
14	5:00 p. m.	Moon nearest 222,300 miles.
16	6:30 a. m.	Moon passes Venus.
20	3:11 p. m.	Moon in first quarter.
	7:38 p. m.	Spring commences.
	10:54 p. m.	Moon passes Saturn.
25	10: p. m.	Neptune nearest, distance 2,720,000,000 miles.
26	5:00 a. m.	Mercury farthest east of sun.
27	1:13 a. m.	Moon passes Jupiter.
28	1:44 p. m.	Full moon.
29	8:00 a. m.	Moon farthest, 252,600 miles.

Subtract one hour for CWT, two hours for MWT, and three for PWT.

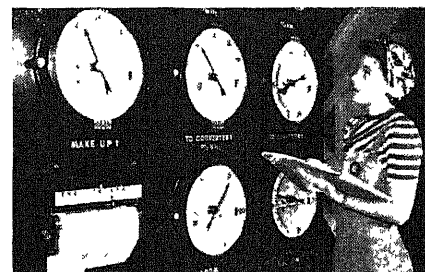
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states that the use of the walk-around oxygen equipment does not eliminate the need for wearing life vests.

The primary job of the walk-around oxygen equipment is to give airmen freedom to move about their bomber at high altitudes, without risking their lives through the removal of their oxygen masks. Pilots and air crewmen need oxygen at high altitudes because without it they have faulty judgment, poor coordination, and short memory.

Atmospheric pressure, which under normal conditions near sea level forces oxygen into the blood stream through the lungs, falls off at high altitudes so that less oxygen actually gets into the blood, unless an oxygen mask is used.

The walk-around oxygen unit consists of a low-pressure oxygen cylinder with a harness, and a regulator which dilutes oxygen with air whenever it is safe to do so, and supplies more oxygen on demand. The same mask that is used with a regular oxygen station can be used with the walk-around assembly. In addition to allowing airmen to move around the plane away from their oxygen stations, walk-around bottles can be used to revive a crew-member. (Turn to Page 127)



HOW T.V.A. NITRATE PLANT SPEEDS GAS ANALYSES

Gas Analyses, made automatically and continuously, are an important feature in the great T.V.A. Nitrate Plant No. 2 at Muscle Shoals, Ala. Here nitrogen is extracted from the air and made available for explosives, fertilizer, etc.

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INVENTION-PHYSIOLOGY

Walk-Around Oxygen Unit

Helps save the lives of airmen by enabling them to breathe under water as well as by supplying oxygen at high altitudes.

➤ WALK-AROUND oxygen units help save the lives of airmen by enabling them to breathe under water while trying to escape from their downed bomber planes, as well as by supplying vitally-needed oxygen at the high altitudes at which modern bombers fly.

Many men, uninjured when their shot-up planes crashed into the sea, have lost their lives by drowning because they were unable to breathe under water while trying to escape through hatches and windows. The walk-around equipment enables them to breathe while finding a way out of the plane, bob up to the surface of the water, and float for a time as

though buoyed up by life vests.

The new equipment was developed by Capt. W. C. Kulesz, of the Aero Medical Laboratory at the Air Technical Service Command. Length of functional time depends upon water pressure as well as on the pressure in the oxygen bottle or cylinder. Approximate durations obtained during tests were six minutes at a depth of 10 feet, five minutes at 20 and 25 feet and 3.5 minutes at 50 feet.

Instructions to flyers in doomed bombers direct the men to don their portable oxygen equipment immediately after bracing themselves in ditching position for the impending impact. Capt. Kulesz

Do You Know?

California and Iowa rate first and second in U. S. *honey* production.

High temperatures are not pleasing to *desert reptiles* as commonly supposed; all of them will die if exposed too long to direct summer sun.

Several billion *bacteria* were found in a teaspoonful of scrapings from the hull of a boat that had been in the water 36 months.

Silicone rubber, a new synthetic, is as pliable as soft putty, but when rolled into a round mass will bounce like a natural rubber ball.

Dogs have proved valuable in the war because their keen sense of smell can detect a strange presence at distances up to 500 feet depending on weather and wind conditions.

Nearly 20,000,000 *fur-bearing animals* were taken in the United States and Alaska during 1943; the fur catch was worth approximately \$100,000,000 to the trappers.

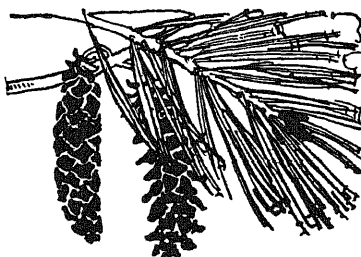
As *animals* are not allowed in public air raid shelters in England, at the height of the London raids, 7241 animals which had been buried under debris were rescued in a single week.

Cabbage contains a substance, though not as strong as penicillin, that acts against bacteria, and its presence in sufficient quantity is believed to prevent the development of objectionable colors, odors, and flavors in sauerkraut.

The pine-looper, a forest pest known technically as *Bupalus piniarius*, is being killed in Sweden by spraying from a low-flying plane a preparation called gesarol which is harmless to humans and higher animals.

Long, narrow, irregularly-shaped *oysters*, found on uncultivated reefs in the South, are known as coon oysters, and owe their shape, it is thought, to soft, muddy bottoms and over-crowding of oysters in a narrow zone.

Largest and most prized member of the herring family is the *shad*, generally regarded as one of the best fishes of the Atlantic Coast; it is now a Pacific Coast fish since its transplanting there in the 1870's.



Evergreen Leaves

➤ **EVERGREENS**, we are rather prone to assume without thinking particularly about it, hang onto their leaves indefinitely. We see perennial green on needle-leaved trees like pine and spruce, or broad-leaved ones like magnolia and holly, and it seems as if they always kept the same set of leaves. When we walk under them we of course realize immediately the error of such an assumption, for the ground is always littered with brown, dead foliage—often carpeted with these discarded leaves.

Actually, each kind of evergreen has its own length of leaf-life and its own mode of letting go of dead leaves. Pines, for example, keep their leaves from two to half-a-dozen years, according to species. Magnolias generally lose last year's leaves during the current year's growth.

You can get a pretty fair indication of how long an evergreen tree or shrub hangs onto its leaves by looking at the twigs. If the leaves are bunched out near the ends, they don't stay on very long after their first season; if they clothe the twigs "way back to the elbows" they are more persistent. You can get a more exact notion by looking for the circling clusters of leaf-scars that mark the ends of each year's growth. Counting backward from the ends of the present shoots, you can easily tell how old a given twig is, until the bark grows so rough that the leaf-scars are lost.

As new leaves unfold from their buds in spring, there is a sharp color contrast between them and the persisting older leaves. New leaves are light green, even pale; old leaves are dark. As spring passes over into summer, however, this color difference is lost in the darkening of the maturing leaves.

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CHEMISTRY

Activated Clay Filter For De-Leading Gasoline

➤ **DE-LEADING** leaded gasoline is something soldiers very much want to do, when they need field-stove fuel or cleaning fluid and only ethyl gasoline is available. To accomplish this, F. E. Neef, Jr., of Detroit, has invented a process on which he has received U. S. patent 2,368,261. Rights to manufacture and use are assigned, royalty-free, to the government.

The process is quite simple. It consists merely in filtering the gasoline through a column of fine-grained clay (bentonite) which has been activated either by heating or by treatment with hydrochloric or sulfuric acid. The inventor states that the action is not a simple physical filtering one, but that there is a chemical reaction between the dissolved chemical and the activated clay.

Science News Letter, February 24, 1945

Facts ABOUT



SCIENCE AT THE BATTLEFRONT

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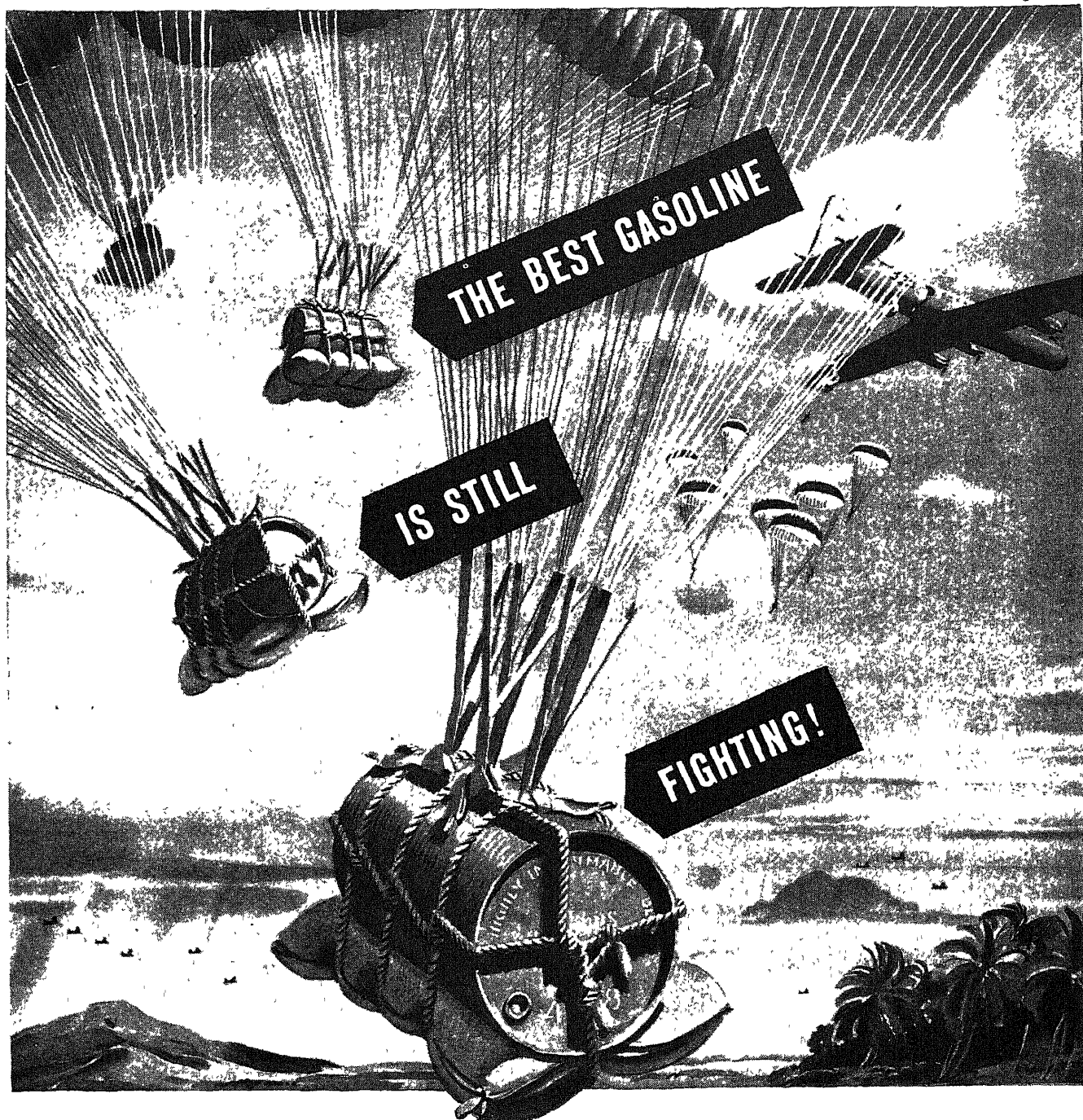
and

Rear Adm. J. A. Furer, U.S.N.

SATURDAY, MARCH 3

2:15 EWT—CBS

Science Service Radio Feature



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RESEARCH

Weapons For Future Wars

Many of our best known leaders are at work on numerous projects in university laboratories, research institutes and industrial plants.

► MANY of America's best known leaders in science are already at work on weapons that will be used by the United States in the event of another war emergency. They function collectively as the new Research Board for National Security.

Numerous projects are under way now in university laboratories, research institutes and industrial plants. To reveal nature and subjects of these experiments at this time might endanger national security.

Working to develop new weapons, without compensation except for expenses, are such men as Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, Dr. H. S. Gasser, director of the Rockefeller Institute for Medical Research; Rear Admiral J. A. Furer, coordinator of Research and Development in the Navy Department; Dr. E. O. Lawrence, professor of physics at the University of California; and Vice Admiral Ross T. McIntire, Chief of the

Navy's Bureau of Medicine and Surgery.

As members of a 40-man committee of the National Academy of Sciences, created by Dr. Frank B. Jewett, president of the Academy, at the request of Henry L. Stimson, Secretary of War, and James Forrestal, Secretary of Navy, these men are formulating programs of scientific research and development to strengthen national security. Appointment of this committee results from a report of the Congressional Committee on Postwar Research and Development, headed by Charles E. Wilson, which advised the setting up of such an organization to continue and expand in peacetime scientific research on the mechanisms and devices of warfare carried on in wartime by the temporary emergency Office of Scientific Research and Development. The research board has already taken over several of the OSRD projects.

Conspicuous by his absence from the new committee is Dr. Vannevar Bush, of the Carnegie Institution of Washington, and now director of OSRD. Although he was invited to become a member of the new committee, Dr. Bush declined, stating that he did not want to appear to dominate the new organization.

Chairman of the Research Board for National Security is Dr. Karl T. Compton. Cooperating with him are four members of the executive committee: Dr. Roger Adams, head of the department of chemistry at the University of Illinois; Dr. A. R. Dochez, professor of experimental medicine and surgery at the College of Physicians and Surgeons, Columbia University; Brig. Gen. W. A. Borden of the War Department Special Staff; and Rear Admiral Furer. Board members include 17 civilians, selected by the National Academy of Sciences, nine representatives of the Army selected by the War Department, and nine representatives of the Navy, selected by the Navy Department. Placement of military members of the armed forces in reserve status after the war is not expected to affect their participation in the research program.

While the board is set up only on a

temporary basis, it is believed by many informed observers in Washington that it will be permanently established by act of Congress. In the event that Congress establishes a new organization, the research activities now under way will be transferred to it. The Woodrum committee is now considering a permanent organization.

Other members of the research committee are: Dr. E. K. Bolton, E. I. du Pont de Nemours and Company; Dr. Oliver E. Buckley, Bell Telephone Laboratories; Bradley Dewey, Dewey and Almy Chemical Company; Dr. Lee A. Du Bridge, NDRC; Dr. H. S. Gasser, Rockefeller Institute for Medical Research; Dr. A. Baird Hastings, Harvard University; Dr. J. C. Hunsaker, NACA; Dr. W. S. Hunter, Applied Psychology Panel, NDRC; Zay Jeffries, General Electric Company; Dr. C. C. Lauritsen, California Institute of Technology; Dr. E. O. Lawrence, University of California; Dr. Linus Pauling, California Institute of Technology; H. W. Prentiss, Jr., Armstrong Cork Company; Dr. I. I. Rabi, Columbia University; Dr. Elvin C. Stakman, University of Minnesota; Dr. Oswald Veblen, Institute for Advanced Study, Princeton; Dr. Lewis H. Weed, National Research Council; Dr. E. L. Bowles, expert consultant to the Secretary of War; Maj. Gen. Levin H. Campbell, Jr., Chief of Ordnance; Lt. Gen. B. M. Giles, Army Air Forces; Maj. Gen. John E. Hull, Chief of Operations Division; Maj. Gen. Harry C. Ingles, Chief Signal Officer; Maj. Gen. Norman T. Kirk, Surgeon General of the Army; Maj. Gen. William N. Porter, chief, Chemical Warfare Service; Maj. Gen. Wilhelm D. Styer, Chief of Staff, Army Service Forces; Maj. Gen. Albert W. Waldron, chief, Requirements Section, Army Ground Forces; Vice Admiral Frederick J. Horne, vice chief of naval operations; Vice Admiral Ross T. McIntire, chief, Bureau of Medicine and Surgery; Vice Admiral Ben Moreell, chief, Bureau of Yards and Docks; Rear Admiral H. G. Bowen, special assistant to the Secretary of the Navy; Rear Admiral W. J. Carter, assistant chief, Bureau of Supplies and Accounts; Rear Admiral E. L. Cochrane, chief, Bureau of Ships; Rear Admiral W. S. De Lany, assistant chief of staff, Readiness Division; Rear Admiral George F. Hussey, Jr., chief, Bureau of Ordnance; Rear Admiral DeWitt C. Ramsey, chief, Bureau of Aeronautics.

Science News Letter, February 24, 1945

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Books of the Week

➤ **COMMITTEE REPORT**, prepared by over 40 electrical engineers in electrical equipment and other industries and in public utilities, is included in **ELECTRIC POWER DISTRIBUTION FOR INDUSTRIAL PLANTS**. It is an authoritative and valuable publication for those engaged in the design, construction and maintenance of electrical power installations. (*American Institute of Electrical Engineers*, \$1)

Science News Letter, February 24, 1945

OVER 10,000 useful metallurgical terms are included in **METALS AND ALLOYS DICTIONARY**, an up-to-date reference work, by Dr. M. Merlub-Sobel, containing definitions of these terms, and the composition, properties and uses of the important commercial alloys. It is written in language which the layman can easily understand (*Chemical Pub. Co.*, \$4.50)

Science News Letter, February 24, 1945

Just Off the Press

THE ANNUAL OF THE AMERICAN SCHOOLS OF ORIENTAL RESEARCH, For 1943-1944—Millar Burrows and E. A. Speiser, eds—*Am. Schools of Oriental Research*, 162 p., illus., \$2.50

THE BOY CHEMIST—A. Frederick Collins—*Odyssey*, 341 p., illus., \$2.75, rev. ed.

AN ESSAY ON THE PSYCHOLOGY OF INVENTION IN THE MATHEMATICAL FIELD—Jacques Hadamard—*Princeton Univ. Press*, 143 p., \$2.

AN INTRODUCTION TO ELECTRONICS—Ralph G. Hudson—*Macmillan*, 97 p., illus., \$3.

ELECTRIC POWER DISTRIBUTION FOR INDUSTRIAL PLANTS—A. I. E. E. Committee on Industrial Power Applications—*Amer. Inst. of Elec. Eng'rs*, 107 p., paper, illus., \$1

JAPAN AND THE JAPANESE, a Military Power We Must Defeat, a Pacific Problem We Must Solve—The Editors of *Fortune*—*Infantry Journal*, 166 p., paper, illus., \$25c.

LATIN AMERICAN UNIVERSITY JOURNALS AND SERIAL PUBLICATIONS, a Tentative Directory—Katherine Lenore Morgan—*Pan American Union*, 74 p., paper, 50c.

MICROBIOLOGY AND PATHOLOGY—Charles F. Carter—*Mosby*, 777 p., illus., \$3.50, 3rd ed.

POET PHYSICIANS, an Anthology of Medical Poetry Written by Physicians—Mary Lou McDonough, comp.—*C. C. Thomas*, 210 p., \$5.

PRACTICAL MARINE NAVIGATION—James A. Stowell—*Addison-Wesley Press Inc.*, 133 p., illus., \$2.50

THE PSYCHIATRIC NOVELS OF OLIVER WENDELL HOLMES—Clarence P. Oberndorf—*Columbia Univ. Press*, 268 p., \$3.

STABILIZING THE CONSTRUCTION INDUSTRY—Miles L. Colean—*Nat. Planning Assn.*, 38 p., paper, illus., 25c (Planning Pam No. 41).

TWO BILLION ACRE FARM, an Informal History of American Agriculture—Robert West Howard—*Doubleday*, 209 p., \$2.50.

THE USE OF PERSONAL DOCUMENTS IN HISTORY, ANTHROPOLOGY, AND SOCIOLOGY—Louis Gottschalk and others—*Social Science Research Council*, 243 p., paper, \$1.50 (Bull. 53).

Science News Letter, February 24, 1945

NUTRITION

Fermented Grass Leaves Produce New Beverage

➤ **NEBUCHADNEZZAR** took his grass straight, like a cow; we moderns may get it as an amber-colored drink. Patent 2,369,042, issued to W. R. Graham, Jr., and C. W. McCarty of Kansas City, Kans., covers a process for making a dark beverage out of grass or sprouted grain foliage that has been wilted and slightly crushed to release the digestive enzymes, then permitted to ferment naturally for anywhere from three hours to three days. Dried for storage and shipment, the product may be soaked in water to produce the beverage whenever desired. Patent rights are assigned to American Dairies, Inc., and the Quaker Oats Company.

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From Page 123

ber who gets into trouble away from his oxygen station, or as extra oxygen stations in case the plane's oxygen system should be put out of commission.

When full, the cylinder contains oxygen at a pressure of 425 pounds per square inch. Depending upon the wearer's activity, altitude of flight, and on which of three styles of bottles is in use, the oxygen will last three to 50 minutes.

Curiously enough, the higher the altitude, the longer the oxygen will last. The more active a person is, the less time it will last. Flyers are instructed to recharge their bottles as soon as the pressure gauge reaches 100 pounds per square inch. There is a recharger hose at every oxygen station on a bomber.

Science News Letter, February 24, 1945

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• New Machines and Gadgets •

⚙️ **ROTOTILLERS** may replace plows and harrows in tilling American farms. They dig up, churn and crumble the soil with steel picks rotating like paddle-wheels, preparing a seed bed in one operation. Used for years in Switzerland, the Rototiller is now made and used in America.

Science News Letter, February 24, 1945

⚙️ **RE-INKING** device for typewriter ribbons applies ink uniformly as the ribbon is passed from a spool to be re-wound on a reel. The ribbon is run between two pads which are inked from a reservoir, and then between rollers that spread the ink and force it into the fabric.

Science News Letter, February 24, 1945

⚙️ **ACID-PROOF** apron for heavy duty is made of a treated fabric combined with a new plastic by a special calendering process which makes material acid-proof throughout. It can be washed and cleaned without injury to the acid-proofing qualities.

Science News Letter, February 24, 1945

⚙️ **PRUNING SHEARS**, operated by fluid pressure from a power cylinder mounted on the lower end of a pole, close and cut when the compressed air or other fluid carried in a tank is released to the cylinder by means of a push-button valve. The cutting blades are opened by a spring.

Science News Letter, February 24, 1945

⚙️ **HEELS** for ladies' shoes shown in the picture have an outside covering of



thermoplastic evenly distributed about a sixteenth of an inch thick and without seams. The plastic slightly impregnates the wooden core to form a permanent bond. Dull or shiny finishes in many colors are available.

Science News Letter, February 24, 1945

⚙️ **TOBACCO PIPE** with a grate and ash pit, recently patented, gives a clean, cool smoke, it is claimed, and keeps moisture away from tobacco and pipe-stem. The grate is a perforated disk in the bottom of the bowl; the ash pit is a horizontal tube below, into which the stem fits. A plug at the rear permits cleaning.

Science News Letter, February 24, 1945

⚙️ **LAMP CHANGER** for elongated electric discharge lights of the fluorescent type is a grasping device on a long pole permitting the user to stand on the floor. With it he grasps the tube, rotates it 90 degrees, and pushes a hand-grip attached to a rod inside the pole that operates the releasing device.

Science News Letter, February 24, 1945

⚙️ **NON-SPLITTING** nail, for thin molding strips and other fine woodwork, has two sharpened cutting edges forming a V-shaped groove across the end instead of the ordinary wedge-shaped point. These edges cut the fiber as the nail is driven.

Science News Letter, February 24, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 247.

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Question Box

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13 MAR 1952

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 3, 1952



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New Delhi

Before Battle

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A SCIENCE SERVICE PUBLICATION

MEDICINE

Treatment for Flat Feet

Procaine hydrochloride is injected through the sole of the foot into the sore, painful places; has been successful in trial cases.

➤ **SUCCESS** with an injection treatment given sailors with flat feet or even normal feet that ache from over-exertion is reported by Lieut. Comdr. Herbert E. Hipps and Lieut. Hugh Neely, of the Navy Medical Corps (*Naval Medical Bulletin*, February).

The average hospital stay for this condition was reduced from about 33 days to six days. Usually after the second treatment the men said they wanted to return to duty.

To the surprise of the medical officers, the number of men coming to the hospital complaining of sore feet fell off 50% after the injection treatment was started. Fear of the new "needle" treatment, the officers believe, was enough to discourage the malingerers, misfits, dissatisfied men and those with only a very minor degree of foot discomfort.

The treatment follows a relatively new method of treating sprained ankles and other simple sprains. Procaine hydrochloride, a pain-killing chemical like that used in pulling teeth, is injected through the sole of the foot into the sore, painful places. Then the patient lies face downward with his knees bent to a right angle and the bottoms of his feet are massaged with an alcohol sponge for about five minutes. He then is required to walk up and down about the ward about 25 times, which makes a distance of about a quarter of a mile. After that he is free for the day.

The injections followed by the walking are repeated every third day. When the man is discharged from the hospital he is given a note requesting two weeks' light duty.

Besides speeding recovery, the injection treatment is not followed by nearly so many recurrences as other methods. The success of the treatment, the medical officers state, may be partly due to actual benefit to the foot and partly to the psychological effect on the patient. This last fits in with the 50% reduction in complaints of painful feet.

Stretching of the ligaments is considered the basic, major cause of persistent pain in all overused feet if infectious, degenerative, metabolic and gross injury cases are ruled out. With freedom from

pain after the injection, the patient can continue to walk. This prevents loss of strength and tone in leg and foot muscles during the recovery period and also allows the ligaments to increase in strength since they can be used painlessly.

Science News Letter, March 3, 1945

MEDICINE

Penicillin Injections Cut From Eight to Three Daily

➤ **THE NUMBER** of penicillin injections given patients can be cut from eight to three per day when the mold chemical is mixed with a special gelatin and a chemical of the kind used in nose drops, four University of Pennsylvania medical scientists report in (*Science*, Feb. 23).

The scientists are: William M. Parkins, Marjorie Wiley, Jacob Chandy and Dr. Harold A. Zintel.

The number of injections of penicillin can be reduced because the gelatin and chemical delay the absorption of penicillin, letting it remain in the blood longer. It does not reach as high a peak concentration, however, and in some cases it

may not be an advantage to have blood penicillin concentration kept at a constant level, the scientists point out.

The chemical used was of the type that constricts the small blood vessels. Two such chemicals, both popular for relief of stuffy noses in colds, were tried. Either of these chemicals alone or the gelatin alone was effective in maintaining blood penicillin levels. Chemical plus gelatin had an even better effect. The two chemicals tried were Privine (2 naphthyl-methyl imidazoline hydrochloride) or Neosynephrine (laevo-alpha-hydroxy-beta-methyl-amino-3-hydroxy-ethylbenzene hydrochloride).

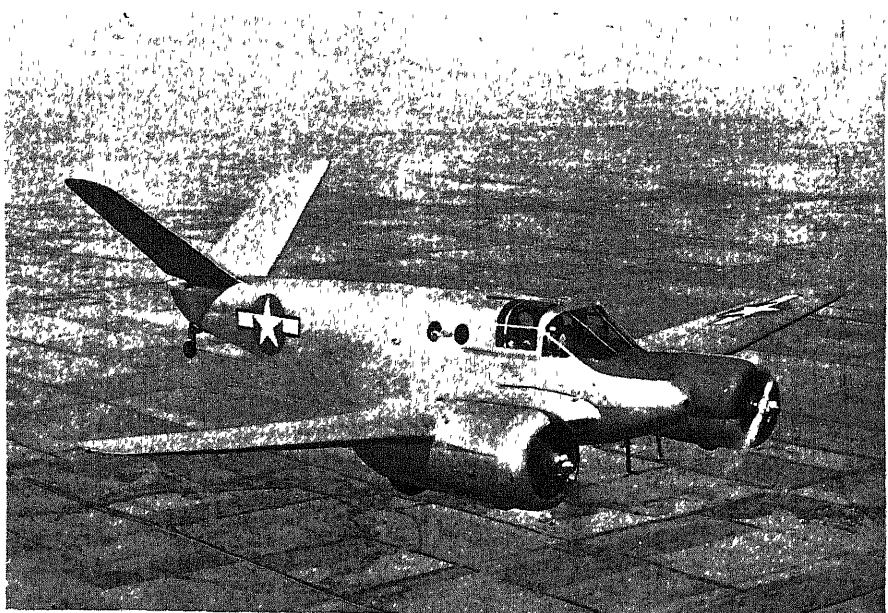
Science News Letter, March 3, 1945

AERONAUTICS

Butterfly Tail on Plane Is Radical Departure

➤ **A STRANGE-LOOKING** plane with a V-shaped "butterfly tail" is being seen these days by residents of Wichita, Kans., and nearby communities as it is taken on test flights. The new tail, a radical departure from the conventional inverted T-shaped tail, was installed on an AT-10 trainer plane to investigate the possibilities of simplified structure, the elimination or reduction of compressibility effects at high speeds, and the effect on stability, control, and handling ease, (*American Aviation*, Jan. 1).

Science News Letter, March 3, 1945



BUTTERFLY TAIL—Stability and control characteristics of this V-tailed Beechcraft are rated "excellent" by test pilots who have flown it.

RADIO

Radar's Future

When the war is over, it may be used to cut down railroad accidents, and even your automobile may be equipped with a unit.

➤ IF YOU have ever shouted in the direction of a cliff, then measured the time it takes the echo to return to determine how far you are from the cliff, you have used a means similar to radar to check distance. However, radar uses ultra-high frequency radio waves, while the echo is made up of sound waves.

Many important Allied victories would have been virtually impossible without radar. In anti-aircraft defense, radar is used to detect the approach of raiding planes at great distances through darkness and fog. Installed on fighter planes, radar enables pilots to spot enemy planes in bad weather, and to get range for attack. It helped lick the U-boat menace by spotting submarines when they came to the surface at night to recharge their batteries. In spite of fog, smoke, or night's blackness, radar can spot the enemy more than 100 miles away. The day-after-day bombardment of Germany's arsenals and supply lines that preceded the invasion would not have been possible without radar.

When the war is over, radar will not drop out of the picture. Today we have only reached the bare beginning of radar development. Many peacetime applications are already known, others only need time for research to bring them into practical form.

When the war is over radar may be used to cut down railroad accidents. Radar units mounted in the engine cab of a locomotive would enable the engineer to detect oncoming trains on the same track, or trouble ahead, so that he could slow the train down in time. He would use the invisible eye of radar to give him visibility in storms, fog or on moonless nights.

Ships equipped with radar can sail into a harbor during a heavy fog and come into dock without colliding with other ships. At sea, radar will detect other ships, icebergs, floating wrecks, and other hazards.

In the air, radar will give pilots of commercial airliners an accurate picture of their altitude at all times. It will also detect objects such as high tension wires, radio antennae, tall buildings, mountains and other planes even though they are

not visible, so that the pilot can steer clear of them. It will permit a plane to land in a dense fog, without other assistance.

Even your automobile may have a radar unit that will make driving safe in fog, storms, or snow. With a radar beam shooting out in front of your car you would know of the position of obstructions, other cars and trucks even though you cannot see them.

Until recently, it was taboo even to mention the word "radar," which means radio detecting and ranging: *ra* (radio) *d* (directioning) *a* (and) *a* (ranging). The letters r-a-d-a-r spell the same forward and backward. This spelling of the word gives a clue to what it is, a radio echo.

Twenty-two years ago, Dr. A. H. Taylor and Leo C. Young of the Naval Research Laboratory discovered that certain radio waves bounced back from steel, like

the echo from a cliff. This was the beginning of radar for America as we know it today. Other pioneers rapidly picked up the idea and intensive research is still in progress. These men were Maj. Gen. Roger B. Colton, U. S. Army, Dr. John H. Dellinger, of the National Bureau of Standards, and Robert M. Page, of Naval Research Laboratory. Although these men were long on faith in radar, they were short on funds to carry on research.

As World War II came nearer to being a reality, radio manufacturers gave their cooperation in perfecting military radar, and in getting it into mass production. Today, military and naval men agree that we might have lost the war 10 years before it began, if these pioneers had not persevered in radar research.

The Axis got its first taste of radar from the United States on the night of Nov. 14, 1942. Out in the Southwest Pacific, off Guadalcanal, it was storming, and one of our warships was hunting for Jap men-o'-war. Like a searchlight beam, the radar beam probed the enshrouding turbulent darkness, until a reflected signal was received, registering the presence of an enemy vessel more than eight miles away.

Our big battleship raised her guns, and sent powerful high explosives thundering



DRESSED FOR WINTER—American soldiers in western Europe have devised a variety of winter coverings for their jeeps, as shown in this OWI photograph. This jeep has a plastic top constructed entirely of salvaged material, complete with windshield wipers, a spotlight and a windshield defroster.

into the storm towards the spot where they knew the Jap ship lay. The second salvo landed squarely on the enemy man-o-war, 14,000 yards distant. This experience vividly demonstrated radar's ef-

fectiveness, and soon afterwards compact radar units were being installed in airplanes, as well as on land and aboard ships.

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ENGINEERING

Research Needed

Technical progress in the construction industry has been relatively slow in the past, and extensive research is now needed.

➤ TECHNICAL progress in the construction industry as a whole has been relatively slow in the past, and extensive technical research is now necessary if the industry is to be stabilized. Highway construction, and to a lesser extent heavy bridge and dam construction, have become thoroughly mechanized, but progress in other fields has lagged. This is the opinion of the National Planning Association, a voluntary association certified under the laws of the District of Columbia, in a report entitled "Stabilizing the Construction Industry."

The report, prepared by Miles L. Colean, states: "The costs resulting from the traditional handicraft methods still characteristic of most building operations have prevented the industry from fully exploiting its potential markets and at the same time have caused it to overbuild for the limited part of the market it has been able to reach."

"Another industrial problem comes from the slowness or failure of builders to shift from types of construction for which the demand may be currently satisfied to those where demand may still be latently effective," the report continues.

Some contractors have demonstrated considerable flexibility in shifting from one type of construction to another, but most find it difficult to shift profitably to unfamiliar types of structures and retire temporarily when the market for their usual products declines or disappears.

Research activities are engaged in by many large manufacturers of construction in the use of more economical methods of their scientific work is concerned with the development of their own products.

"Only to a minor degree is research directed to the development of well-balanced end products and experimentation in the use of more economical methods," Mr. Colean declares.

To conduct the needed technical research, the report recommends that "as-

sistance from the federal government should be considered." A precedent for this type of activity on the part of the government has already been set in agriculture, mining, aviation, and in highway construction. The National Bureau of Standards and the U. S. Forest Products Laboratory already have facilities capable of expansion, the report states, and the government could expand and coordinate work now proceeding in a piecemeal and unrelated way.

The primary aim of the government activities recommended by Mr. Colean "would be to advance the productivity of the construction industry (with resultant lower costs per unit of volume), increase the total physical volume, and, most important, encourage expansion of types of construction now restricted because of high cost."

The program, also, would help building organizations reorient their production as made advisable by variations in demand.

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ENGINEERING

New 7-Cylinder Engine Develops 700 Horsepower

➤ A NEW seven-cylinder air-cooled radial engine that develops 700 horsepower on inexpensive low-octane fuel has been announced by G. W. Vaughan, president of the Curtiss-Wright Corporation.

Known as the Cyclone 7, the new engine will permit airplane manufacturers to design short-range cargo planes and military trainer planes around a 700 horsepower installation. The new engine is similar to the nine-cylinder Curtiss engine which powers more than 80% of the nation's airlines. Close resemblance between the two makes it possible to interchange many parts, thus reducing maintenance problems.

The combustion chamber is designed for gasoline of an octane rating much

lower than that of planes in the air today. Horsepower output would be correspondingly greater if higher-octane fuels were used.

The new engine is provided with a two speed supercharger drive. The higher supercharger ratio is adequate for the development of maximum engine power at high-altitude airports. The lower supercharger ratio supplies extra power for high performance at airports situated at low altitudes.

To improve lubrication within the engine, oil jets have been provided in the crankcase to direct a continuous flow of oil into each cylinder barrel.

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AERONAUTICS

Aviation Improvement

Radar, gas turbines, jet propulsion and the helicopter will probably be most effective in the advances of the near future.

➤ RADAR, gas turbines, so-called jet propulsion, and the helicopter will probably be most effective in the improvement of aviation in the near future, Dr. C. C. Furnas, director of research for Curtiss-Wright's airplane division, told a meeting of the Junior Chemical Engineers.

"The coming era of air travel is almost certainly destined to make major changes in the pattern of American living, and, in the not distant future, in the way of life all over the world," he prophesied.

"One of the fair-haired boys of this war has been radar, which is an abbreviation for 'radio directioning and ranging,'" he stated. "Many of its applications and methods of operation are still secret, but in general it may be said that radar uses short radio waves as a substitute for light rays. This makes it possible, with proper instrumentation, to see and to make measurements no matter what may be the conditions of weather or darkness."

Dr. Furnas predicted that radar is going to become the basis for automatically keeping a plane a safe distance above obstacles, for exact navigation at all times, for collision prevention and for blind approach and blind landing systems which will be used in bad weather.

"The principal enemy of aircraft schedules is weather," Dr. Furnas stated, "Mark Twain notwithstanding, you can't do much about the weather. But soon it will be possible to complete scheduled commercial flights no matter what the atmospheric conditions may be."

He pointed out that radar, plus the use of exhaust heat to prevent the formation of ice on the wings and fuselage, will eventually make it possible to maintain a reliability of schedule at least as good as that of the railroads, with almost equal safety.

"If the aircraft manufacturers seriously take hold of the developments which the long-haired physicists have made during the last few years, we can expect to see a real revolution in air travel to begin within the next few years," Dr. Furnas predicted.

The gas turbine may render the conventional reciprocating engine obsolete for aircraft use in sizes above 1,000 horsepower. Recent advances in metallurgy and in certain features of mechanical engineering have now brought this device well into the forefront of the hopeful developments for the future. It will not only be lighter and probably more efficient but will be very much smoother in operation than the engines now in use. This will be an important factor contributing to passenger comfort, Dr. Furnas declared.

If the public demands planes traveling from coast to coast in five or six hours, we may expect jet-propelled aircraft cruising through the air at high altitudes at a speed between 500 and 600 miles an hour, with not more than one or two stops, he remarked.

While the helicopter is still a long way from perfection, difficult to fly and not particularly reliable, Dr. Furnas predicts that when some of its problems are solved

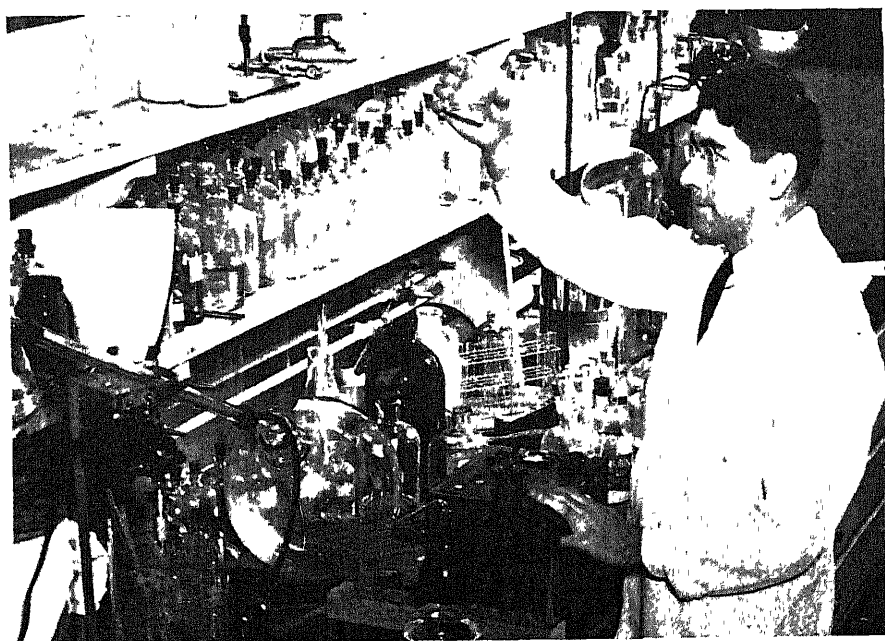
the helicopter can replace surf boats of the Coast Guard. It can also be used in crop-dusting for the control of pests, for carrying men and equipment to and from forest fires, for use on cattle ranches and in oil fields. Gradually it will evolve as a means of moderate-distance transport for commercial and private use.

Speaking of the private plane, he declared that though small private aircraft will eventually play an important role in all our lives they are not going to have the extensive use or be as important as automobiles. In cost, safety, and convenience small aircraft cannot be in the same category with the automobile.

Small aircraft, Dr. Furnas declared, "will never be able to compete with the third-hand broken-down flivver. They are inherently more expensive than automobiles and they must be kept in top condition or they are definitely unsafe. You can lose a fender or even blow a tire on a car with relative impunity but if you lose a wing or a helicopter rotor blade in the air you only do it once."

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Canada has almost doubled her lard production in the past 10 years; much lard is used in Canada for shortening, as that country produces almost no edible vegetable oils.



PENICILLIN PILLS—Dr. Raymond L. Libby is shown in his laboratory where he perfected the use of penicillin in convenient pill form. (See SNL February 24.)

GENERAL SCIENCE

Future Scientists

Will probably come from a broad cross-section of our national family life, survey of Science Talent Search winners indicates.

➤ AMERICA'S future scientists will probably come from a broad cross-section of our national family life. Their fathers are now following such diverse walks of life as farmer, furrier, manufacturer, lawyer, chauffeur, reporter, business executive, insurance agent, postman, chiropractor, and gas station proprietor, as well as scientist. The great majority of their mothers are homemakers; the few who are following careers in writing, teaching and business are doing so for economic reasons. This conclusion was reached on the basis of questionnaires returned by the 40 trip-winners of the current Science Talent Search conducted by Science Clubs of America competing for \$11,000 in Westinghouse Science Scholarships.

Although some of the winners are related to "top-ranking" scientists, the majority report no scientists in their families. The other winners report from one to four relatives who have scored success in some field of science. Nine fathers and one mother are named as successful scientists.

Most famous scientist with a descendant among the 29 boy winners is

John Clerk Maxwell, pioneer in radio theory and a mathematical genius. As a boy in Scotland in the 1840's he incessantly asked, "What's the go o' that?"—the same question asked by every one of these 40 eager young scientists today.

One winner is related to a noted professor of engineering mechanics listed in *Who's Who in America*, *American Men of Science* and *Who's Who in Engineering*. Two others each report a relative in *American Men of Science*. One father is an engineer listed in *Who's Who in Commerce and Industry*.

Relatives reported in science and technology include eight doctors of medicine, three in one family, six engineers, seven science teachers including three college professors, a mathematical consultant for the Bureau of Ordnance of the U. S. Navy, a metallurgist, an astronomer, a mineralogist and a ship designer. One of the doctors is doing research on tropical diseases at the Rockefeller Foundation and another is working in bacteriological research. Other research fields represented are air-conditioning, color photography, and higher mathematics.

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tectors will also assist in locating hidden loot buried in metal containers and in the recovery of guns or other metal weapons involved in crimes.

Highly sensitive plastics will probably replace plaster of Paris or other types of moulage in taking impressions of tire treads, heel prints, foot prints or tool marks. These new materials are so sensitive that fingerprint impressions can be taken from the plastic cast of a hand.

Mr. Davis revealed that more than 125,000 young scientists, members of Science Clubs of America, are cooperating with the FBI in a special study project. They have been particularly interested in man's fingerprints, the only infallible, unchangeable credentials of personal identification. Today the FBI possesses the largest collection of fingerprints in the world, 94,000,000 strong.

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ENGINEERING

Invention of "Duck" Wins Prize for Dr. Jaggar

➤ WORK in developing the first "duck" or amphibian mobile boat won for Dr. Thomas A. Jaggar of Honolulu the Franklin L. Burr Prize of \$1,000, just awarded by the National Geographic Society.

Forerunner of the amphibian vehicles which made possible successful landings by Allied forces in Europe and the Pacific, Dr. Jaggar's wheeled boat was built in 1927 to facilitate his volcano explorations. The 16-foot boat had a Ford chassis and engine mounted inside, and axles and wheels with balloon tires outside.

The boat could be driven along the beach on its wheels, and when Dr. Jaggar desired to go in the water, he simply drove down to the edge and in. Then a pair of steel paddle wheels, about two feet in diameter, were attached. These were partly submerged and drove the boat along. The rear wheels continued to revolve while in the water, though largely submerged. The disk front wheels acted as rudders to steer the boat with the same steering wheel that was used on land.

The boat, named the Sea Turtle, was used by a National Geographic Society expedition headed by Dr. Jaggar to carry on researches in Alaska in the region of Pavlov volcano in 1927-28.

The Burr prize, established under a bequest of the late Mary C. Burr of Hartford, Conn., is awarded to members who have done especially meritorious work.

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ENGINEERING

New FBI Aids

➤ A NEW wartime alloy that is so strongly magnetic that it will lift 4,000 times its own weight will help the Federal Bureau of Investigation recover for evidence criminal weapons and metal objects thrown into deep water, reports Hugh H. Clegg, assistant director of the FBI in charge of training and inspection. Other items resulting from wartime research to be used by police and the FBI are "bullet-proof" gasoline tanks, and "walkie-talkie" radio.

"In the not too distant future every policeman may be a 'walking radio station,' carrying his own personal transmitting and receiving set with him wherever he goes. Every officer would be in immediate contact with his headquarters to report accidents, crimes, or other incidents the moment they occur," he said.

Police photographic equipment now in use will be obsolete by the time the war is over, Mr. Clegg declared in a discussion with Watson Davis, director of Science Service, of how science is helping law enforcement, heard over CBS on "Adventures in Science." Through a secret process developed in the United States, a new type of lens which resembles glass, but is made from oxides of metals, has been produced. This lens is as hard as a diamond and can't be scratched easily. This lens will make smaller pictures possible with much less light than is required today.

Mine detectors used by the armed forces will be of great assistance to police and the FBI in locating weapons or other metal articles buried in the earth or submerged in water, he reported. Mine de-

BOTANY-PHARMACY

New Quinine Sources

Botanists searching the mountain forests of South America, on the wartime cinchona program, have turned up unexpected sources of this important drug.

➤ BOTANISTS searching the mountain forests of South America for quinine-yielding plants have turned up unexpected sources of this important drug, Dr. William Campbell Steere of the University of Michigan reports in *Science*, (Feb. 16).

Dr. Steere and Dr. F. R. Fosberg of the U. S. Department of Agriculture were the first two American botanists to go into the Andean uplands on the wartime cinchona program. They were followed by several others, with such success that the quotas set in 1942 have been exceeded and the parties are one by one returning home.

A number of surprises awaited the botanists when they pushed into the wilderness. One was the discovery that the genus *cinchona* does not have a monopoly on quinine production. Bark of a small tree species known as *Remijna pedunculata* was found to yield up to 3% of practically pure quinine sulfate. This species is abundantly distributed in the eastern range of the Colombian Andes and its foothills.

Another find of major importance was that a supposedly rare species, *Cinchona pitayensis*, is really fairly abundant in both southern Colombia and Ecuador. This species has bark also yielding about 3% of quinine sulfate in addition to other alkaloids of possible drug value.

A considerable number of races or strains of the "standard" cinchona tree, *C. officinalis*, were found in both Colombia and Ecuador. Most of them were low-yielding, but certain local races turned out to be "surprisingly rich" in quinine and other medicinal compounds.

Most of the quinine-yielding bark obtained during the past two years was brought out of Colombia and Ecuador, Dr. Steere reports. The best hunting-grounds used to be in Bolivia and Peru, but over-collection has wiped out some of the best cinchona stands in Bolivia, and the best remaining sources in Peru are so inaccessible that it was not economical to send collecting parties to them.

Dr. Steere gives much credit for the success of the cinchona program to the establishment of assay laboratories near

the sources of the bark. In the old cinchona collecting days, bark had to be sent on long voyages overseas before its quinine content could be estimated. This resulted in great losses in time, as well as in wild market speculation in bark, based on nothing more substantial than hope or guesswork, which of course was an economic waste. The assay laboratories in Bogota, Quito, Lima and La Paz thus saved much money, and (of even greater importance in the present emergency) they also saved a great deal of time.

Science News Letter, March 3, 1945

TYPOGRAPHY

Scap of Parchment Has Arabic Block Print

➤ A DIMINUTIVE scrap of parchment in the Museum of the University of Pennsylvania has been discovered to be one of the few known examples of Arabic block print. This unique fragment lay hidden for over 30 years in the repositories of the museum without its extreme rarity being recognized.

In going through the papyrus collection of the museum, Dr. Giorgio Della Vida remembered that the process of printing from carved wooden blocks, which the Chinese invented and Gutenberg developed into printing with movable type, had reached the Moslem world long before it was known in Europe. Dr. Della Vida, formerly of the University of Rome and research associate in the Vatican Library, therefore recognized the inconspicuous bit of extra-thin parchment, not larger than two inches by one and a half, as an invaluable specimen of block printing.

It is the only example of Arabic block print known to be in America.

Except for one in Heidelberg, all the other examples are printed on paper. The Philadelphia print is on parchment, and was probably made during the fourteenth century.

The Chinese method of printing from wooden blocks never became popular among the Arabs. The cutting of the capricious curves of the Arabic script



ARABIC BLOCK PRINT—Possibly the only one of its kind in the United States, this bit of parchment is one of the few known examples of Arabic block print. It was recognized by Dr. Giorgio Della Vida, professor of Arabic and Semitics at the University of Pennsylvania, among the University's Museum specimens.

out of a hard wooden surface proved too toilsome and the results lacked attractiveness. After the middle of the fourteenth century its use was discontinued.

Arabic block printing was confined to short, cheap texts, consisting either of selections from the Koran or of prayers. All known Arabic block prints are of this type.

The print at the University of Pennsylvania Museum represents the top of a long, narrow scroll which was originally divided into several sections. A minute part of the heading of the second section is visible.

"There is no god but God," is printed in white letters on a black background at the top, followed by the beginning of a prayer. The letters are quite minute, and since they were cut on hard wood they lack the slender elegance of Arabic calligraphy.

Few specimens of these peculiar products of early printing have been preserved. But possibly others lie buried among the miscellaneous items of libraries and museums, awaiting identification.

Science News Letter, March 3, 1945

CHEMISTRY

Synthetic Rubber Now Stands on Its Own Merits

➤ SYNTHETIC rubber is here to stay on its own merits, and it will no longer be used merely as a substitute for natural rubber, reports E. F. Riesing, chairman of the National Division of Rubber and Plastics of the American Society of Mechanical Engineers, and chief automotive engineer of Firestone Industrial Products Co., at a meeting of the ASME.

He pointed to the superiority of the synthetics in specific physical properties such as resilience, efficiency, low-temperature flexing, low-temperature brittleness, high-temperature stability, oil resistance, resistance to ultraviolet rays, ozone, acid, gas diffusion and other important properties.

The facts presented by Mr. Riesing were based upon extensive tests simulating temperature conditions in the African desert and in Alaska. One type of synthetic rubber, a polybutadiene compound, will not freeze or become brittle under stratosphere low-temperature conditions. This particular type of rubber freezes at 100 degrees below zero Fahrenheit.

Science News Letter, March 3, 1945

ENGINEERING

Jet Engines Require Much Less Time and Labor

➤ JET propulsion engines for propellerless airplanes, like the P-59 Airacomet require less than a fifth of the time and labor necessary to maintain a conventional motor, reports Staff Sergeant Earl Kohler, a jet crew chief at Air Technical Service Command headquarters, Wright Field.

The jet engine built by General Electric has only about one-tenth as many moving parts as does the conventional airplane motor. This explains much of the savings in maintenance.

"Most mechanics are surprised to learn that there are only 11 bolts holding the engine in place," Sgt. Kohler commented.

He pointed out that it is possible to take one of the jet engines off the P-59 in 35 minutes, and that four men can remove both jet engines and install new ones in a day.

"Where we used to spend five days doing a certain job on a conventional plane, we can do the same thing for a jet in a day. Where other mechanics use 25 wrenches for a job, we generally use five," he added.

In the jet engine, air comes in the front and goes through the compressors, mixes with kerosene in the combustion chambers and is ignited. It blasts out through the flame pipe, and that is all there is to it.

The jet engine does not have to be warmed up. A minute after the starter button has been pressed, the pilot is ready to take off. Ground crew men also report that the engine cools off very quickly. Once a flight is over, the engine is cool enough to be taken out by the time they remove the cowl that surrounds it.

Science News Letter, March 3, 1945

METALLURGY

James Douglas Gold Medal Awarded to Dr. R. F. Mehl

➤ THE JAMES DOUGLAS gold medal of the American Institute of Mining and Metallurgical Engineers was awarded to Dr. Robert Franklin Mehl, director of the metals research laboratory of the Carnegie Institute of Technology, Pittsburgh, and head of its department of metallurgical engineering.

The medal, established in 1922, was given Dr. Mehl "for distinguished achievement in physics and physical metallurgy; and especially for his development of gamma-ray radiography and for conspicuous success in his metallurgical investigations involving diffusion and crystal structures."

For improving the process of making Bessemer steel, the Robert W. Hunt Silver Medal and Certificate for 1945 was granted E. Chester Wright, chief metallurgist of the National Tube Co., Pittsburgh. The particular type of steel with which Mr. Wright worked is used in making seamless steel tubes, especially the type of steel pipe used in transporting oil, as in the "Big Inch" pipe line.

The J. E. Johnson, Jr., award was granted Carl Gustav Hogberg, assistant to the chairman of the Blast Furnace Committee of the U. S. Steel Corporation "for his contributions to the science and art of smelting iron ores in the blast furnaces," it was announced at the meeting of the board of directors.

For research work leading to the improvement of methods of production of brass cartridge cases, William Marsh Baldwin, Jr., chief metallurgist of the Chase Brass and Copper Company, Euclid, Ohio, was given the 1945 award of the Institute of Metals Division (A.I.M.E.).

Science News Letter, March 3, 1945



AERONAUTICS

Deadlier Dive Bomber Blasts Japs in Raid

➤ A NEW and more deadly model of the Navy's SB2C dive bomber has been revealed, following its use in the recent carrier-based raid on Tokyo. Carrying one of the greatest loads of destructive power ever mounted in a single-engine airplane, its fighting rig includes two 20-millimeter cannon mounted in the wings, five-inch rockets mounted under the wings, half a ton of bombs, also mounted under the wings, and more than 1000 pounds of bombs in the bomb bay.

Newest addition to the family of "Hell-divers," the Curtiss-Wright plane has a powerful radial air-cooled engine and a four-bladed propeller.

"Swiss cheese" perforated flaps on the wings break down the speed of the plane in a dive without excessive buffeting of the tail, thus permitting less experienced pilots to make a truer dive.

Science News Letter, March 3, 1945

MEDICINE

Anti-Germ Substance from Athlete's Foot Fungus

➤ VICTIMS of athlete's foot may find it hard to believe, but the fungus that causes them misery produces an anti-germ substance very much like penicillin.

Discovery of the penicillin-like substance in the athlete's foot fungus was made by Dr. Samuel M. Peck and Dr. William L. Hewitt of the National Institute of Health in Bethesda, Md. They give their findings in *Public Health Reports*, (Feb. 9).

The same anti-germ substance, or antibiotic as it is termed technically, was found in a number of other fungi that cause skin trouble, including one that causes ringworm.

It is active against streptococci, staphylococci and pneumonia germs as penicillin is. Like penicillin, its production is enhanced by corn-steep liquor, and there are other similarities between the two antibiotics. The fungi, however, produce their antibiotic in very low concentrations so they are not expected to become a practical source of the material for use in treatment of infections.

Science News Letter, March 3, 1945

E FIELDS

AERONAUTICS-METEOROLOGY

Picturesque Scene at U. S. Army Air Force Base

See Front Cover

➤ NEAR GERMAN LINES, the B-17 Flying Fortress shown on the front cover of this SCIENCE NEWS LETTER, is blanketed with snow that has fallen during the night.

The serenity of the scene will not last long, however, for within the hour the bomber will be roaring eastwards, high in the icy sub-zero skies, taking part in the day's bombing attacks on German lines of communication behind the western front.

Science News Letter, March 3, 1945

ENGINEERING

Prefabricated Hospital Transported by Air

➤ PREFABRICATED postwar homes and small buildings may be transported by air to the site where they are to be erected, as a result of the development of a portable hospital shelter which can be transported by air in two-thirds the cargo space of a C-47 airplane. It weighs 3,700 pounds complete, and can be erected by a four-man team in two hours.

Two types of shelters have been developed. One is for use in warm, tropical climates, and provision for adequate ventilation has been stressed in its design. The other is for use in the Arctic, and suitable insulation has been incorporated into its construction.

Each unit has two rooms, one 16 by 16 feet and the other eight feet square. Windows can be opened or closed. Provision is made for the use of electricity, and there is a stovepipe outlet in the gable. Each unit has three doors, one to the outside from each of the two rooms, and the third connecting the rooms.

Developed by the Equipment and the Aero Medical Laboratory of the Air Technical Service Command, the small eight-foot entry room is large enough so that when a patient is brought in, the outer door can be closed before the inner door is opened. In cold regions this feature conserves heat, and in the tropics it keeps out insects and other pests. Each unit can accommodate 12 patients on lit-

ters, with enough space left to use for operations and as a dispensary.

If much space is needed, the units can be set up in combinations to meet the requirements of the local situation. Probably one of the greatest uses of the hospital shelters will be at advanced air bases. Here they can be erected near the airstrip so that a hospital plane can taxi up to the shelter and the patients, still on the original litters, can be loaded into it.

Science News Letter, March 3, 1945

GENERAL SCIENCE

Freedom of Science Needed To Maintain World Unity

➤ MAN MUST be free to think, free to conduct research, free to develop his ideas, free to invent and to produce, declares Brig. Gen. David Sarnoff, special consultant to the Communications Branch of the Public Relations Office, Supreme Headquarters of the Allied Expeditionary Forces, and president of the Radio Corporation of America. For this reason, he asserted that there should be a fifth freedom added to President Roosevelt's Four Freedoms, the Freedom of Science, since it, like the other freedoms, is essential to the maintenance of world unity.

"Political and social limitations and expediencies must not fetter the application of scientific knowledge, nor stop the quest for it," Gen. Sarnoff advised.

He called attention to a new science, "Chemotronics", a combination of electronics, supersonics and chemistry, through which scientists may learn the secrets of creating many new products.

General Sarnoff declared that today scientists are on the edge of new discoveries in the realm of electronics. He pointed to evidences already at hand of man's ingenuity to create new products to fill his basic needs by mastery of nature through science.

"Civilization today cries for new Edisons and Marconis, for young men and women to explore the uncharted wilderness of the ionosphere with its cosmic rays and its mysteries as myriad as the stars," he observed.

"Why should man let the heat from the greatest furnace—the sun—go to waste? Why should he let its light be dissipated? The day may come when research will discover how to bottle the heat and light from this great natural reservoir for man to use . . . Science will harness them so that the precious rays will be on tap for use at will, like electricity, and gas," he declared.

Science News Letter, March 3, 1945

TECHNOLOGY

New Courses at MIT Include Textile Research

➤ TEXTILE RESEARCH, food technology and electronics step to the front in the new program at the Massachusetts Institute of Technology in the recent establishment of intensive and extensive courses of study and investigation in these three subjects, based on developments of the past, including the great forward strides under war impetus, the present needs of the armed services and civilians, and future world-wide production and needs. New laboratories and equipment will be available for the work.

The textile investigations will have the use of a new laboratory known as the Samuel Slater Memorial laboratory, named in honor of the man who, in 1790, built the first cotton spinning machinery and started the first cotton mill in the country. It will pioneer in the application of the most advanced scientific knowledge to research on fibers, yarns, and fabrics.

In food technology a far-reaching program to study postwar problems of world food production will be undertaken. It will include the improvement of products and methods for retaining natural flavors and nutritive elements in processed foods, and a study of packaging food products to provide better protection against the ravages of time and climatic conditions. It will make use of the developments of new food products in the past few years, and the accelerated progress in food technology due to the needs of armed services in many different parts of the world.

A new laboratory, bearing the name of Samuel Cate Prescott, will be used by the food technology division. It will be fully provided with food processing equipment and other facilities to carry out its program. The course will cover five years, during which men will spend considerable time in some of the country's great food manufacturing plants and in the research laboratories maintained at these plants.

In the new professional course in electronics, in which their application to television and highly developed production methods will be emphasized, the Institute will have the cooperation of the Philco Corporation of Philadelphia. Under this cooperative course, selected students will spend alternate terms at the Institute and at the Philco plants.

Science News Letter, March 3, 1945

ASTRONOMY

Guide to The Moon

A number of fanciful figures are easy to see if you look for them; a good pair of field glasses reveals interesting surface features.

By MARTHA G. MORROW

➤ ADVENTUROUS boys and girls, thinking they may some day take that rocket trip to the moon and discover for themselves whether it is a deserted land of pumice and volcanic ash, may find a guide to the moon helpful in making their post-postwar plans. Servicemen in inactive areas will find the new map, which gives only the leading craters, mountains and seas, useful in exploring the moon today, just as many of us here at home will enjoy it.

If you look at the moon closely some evening when it is out in its full glory, you may be able to see the "seas" or dark areas without even using a pair of binoculars. These markings on the moon have been called the "man in the moon," "woman reading a book," and the "crab." A number of fanciful figures are easy to see if you look for them.

Many details of the moon become visible when you use field or opera glasses. These bring the moon, which ranges from 220,000 to 253,000 miles from us, to within about 30,000 miles. Then the surface of the moon, which is 2,163 miles in diameter, becomes much clearer. If you will mount your field glasses on a tripod or support it in some other way, you will be better able to distinguish the moon's features.

Dark Plains Visible

With field glasses you can see the wide, dark plains which Galileo and his contemporaries mistook for seas, just after invention of the telescope. They are shaded on both of the accompanying maps, and marked on the index map with capital letters.

Today we know there is no water on the moon and practically no air, but we still use the old Latin names for these "seas." Thus Mare Tranquilas is the Sea of Tranquility; Mare Serenitatis, the Sea of Serenity; and Mare Crisium, the first of the dark areas visible on the new moon, is the Sea of Crises.

The craters, which may have been caused by volcanoes in the youth of the moon or have resulted from meteorites

crashing on its face, can be seen in greater detail when the moon is in first or third quarter. Then the sides of the craters near the unilluminated regions of the moon are highlighted by the slanting rays of the sun, just as shadows here on earth are longer in the early morning and late evening than at midday.

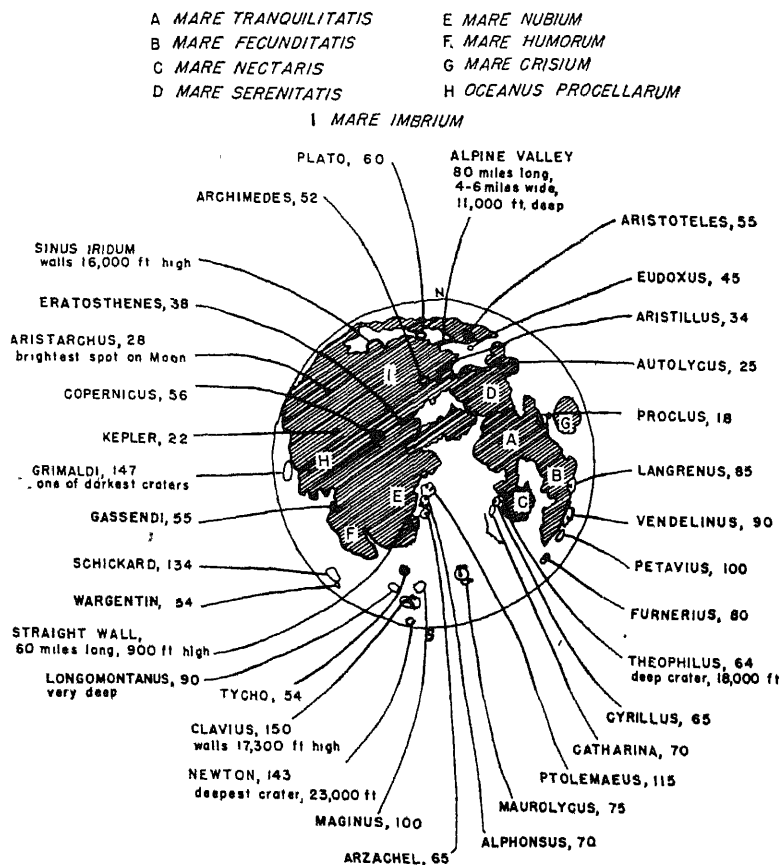
The craters vary in size from pits but a few hundred feet across to great rings of mountains enclosing plains more than 150 miles from side to side. In the center of many craters you will notice a single sharp peak, rising almost as high as the walls. The craters were named after fa-

mous scientists of the past, such as Archimedes, Kepler, Copernicus and Newton.

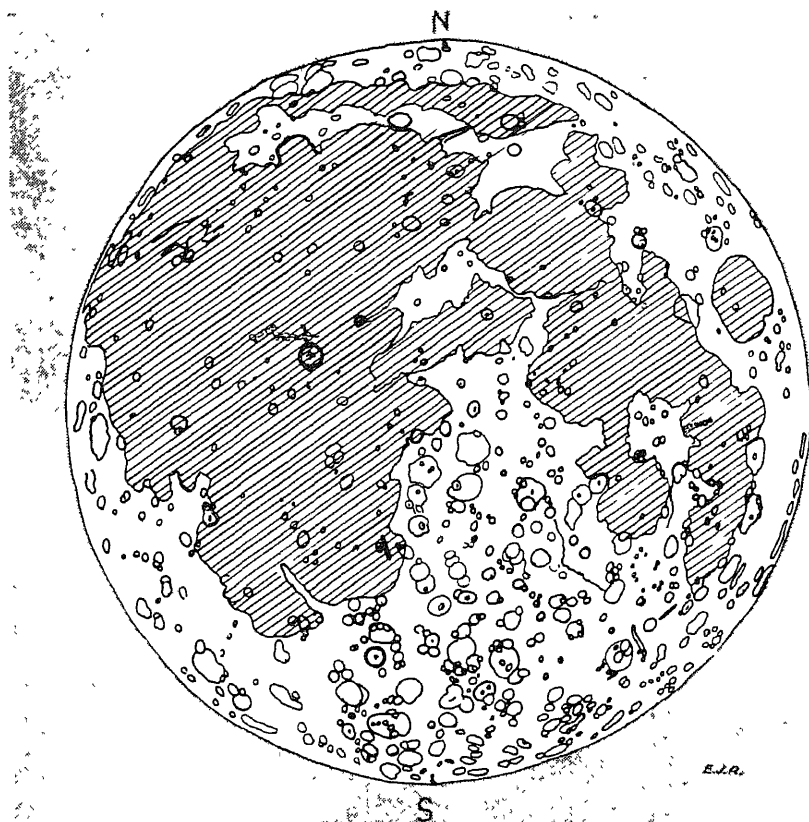
Mountain ranges on the moon, rising as high as 26,000 feet above the surrounding plains, are named after mountain ranges on the earth. The Apennines are found at the upper right of the crater Eratosthenes along the edge of Mare Imbrium, and the Alps, bordering the same sea, are at the lower right of Plato.

Several craters, especially Tycho and Copernicus, have light streaks called "rays" radiating from them. These are best seen at full moon. There are many cracks in the moon's surface called "rills," but none are shown on these maps because a large telescope is needed to see them.

Look for the craters, mountains and seas on the accompanying maps, pre-



INDEX MAP—The names of the leading craters, mountain ranges and seas on the moon are shown in the Ladd Observatory map. The approximate diameter of each crater in miles is listed beside the crater's name.



MOON'S SURFACE—With a good pair of field glasses or small telescope, the interesting features of the surface of the moon are revealed.

pared at Ladd Observatory of Brown University by Miss Jean Roberts under the direction of Prof. C. H. Smiley. Thinking of soldiers, sailors and those of us who have little equipment available, but can possibly borrow a pair of binoculars, they included only the most outstanding features. Some 20 maps and 30 photographs of the moon were examined, and the image of the moon as actually seen through a small telescope was also studied.

Map Is Turned

The map is turned to show the moon as it is seen with the naked eye or through field glasses. Should you be fortunate enough to have a telescope available, the features of the moon will be greatly magnified, but turned upside down. North will appear in the position now occupied by south and the sides likewise will be interchanged.

Month after month, as we look at the moon, which shines only in the reflected light of the sun, we see about the same features. The moon revolves about the earth once every 29.531 days on the average, and this is the interval from full

moon to full moon, or between two new moons. When a thin crescent moon is visible in the skies, the remainder of the disk can be seen faintly illuminated by earthshine, sunlight reflected by the earth to the moon.

Just One Revolution

The moon makes just one revolution on its axis during the journey around the earth, thus the same portion always faces us. But frequently it is slightly out of its average position and we are able to peek into the little-known regions, seeing first a little farther around one side and then an extra portion around the other side. By repeated observations with the telescope and studying photographs taken at different times, astronomers have become familiar with almost 60 per cent of the moon's surface.

Science News Letter, March 3, 1945

Postwar automobile drivers will probably not use 100-octane fuel in their old cars because the engines are not designed to use superpower gasoline; motor car engines using 100-octane fuel may be available several years later.

ELECTRONICS

Miniature Electron Tubes Already in War Use

➤MINIATURE electron tubes recently developed in the laboratories of the Radio Corporation of America in Camden, New Jersey, will permit the construction of smaller home radio receiving sets and compact radio-television-record player combinations in postwar days. They are now in use in war equipment. Typical savings of 20% to 40% in equipment size will result.

The new tubes, some as small as the little finger, are a "wedding" of the acorn type tube, developed in the company's program of research in the ultra-high frequency field, and the filament-type miniature tube developed in 1938. By merging the special features of the two earlier types, a combination is made of the efficient high frequency performance of the acorn with the smaller size and lower cost of the miniature. The new tube has the cathode-type inner structure of the acorn, and the small envelope and base of the filament-type miniature.

Science News Letter, March 3, 1945

New York Sun: "Drive is Begun on Epilepsy."

New York Times: "Some Plain English on Epilepsy."

EPILEPSY—THE GHOST IS OUT OF THE CLOSET

Public Affairs Pamphlet No. 98

(10 cents a copy)

Must ignorance of the scientific facts about epilepsy ruin the lives of increasing numbers of returning veterans, of thousands of young children, and other individuals?

Help to spread the truth that epileptics are people who ask only to be treated as such.

Send for your copy of this pamphlet today—then write us for additional copies to distribute to your friends, your families, your associates; to use in group educational work.

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200 copies, \$15.
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PUBLIC AFFAIRS COMMITTEE, Inc.

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Do You Know?

A six-ounce 36-volt storage battery is used in walkie-talkies.

Dyed, tanned rat tails for wrist-watch straps are reported in Balkan markets; they are made in Germany.

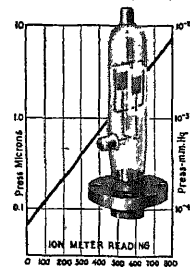
Approximately 7,000,000,000 bushels of rice are produced annually throughout the world.

The first drilled oil well in the world was completed in 1859, near Titusville, Pa.

The kingfish, caught off the coasts of Florida, is a fine-flavored fish weighing usually from 15 to 30 pounds, but sometimes as much as 75 pounds; it often leaps as much as 10 feet out of the water.

A fungus that traps and destroys insects has been discovered; it is a microscopic soil-inhabiting fungus, technically *Arthrobotrys entomophaga*, that catches springtails, insects that jump by means of springy near-end spines.

HIGH VACUUM GAUGES



**IONIZATION GAUGE
COLD CATHODE TYPE**

Measures high vacuums with galvanometer down to 10⁻⁴ mm Hg. in electron microscopes and other high vacuum apparatus. Utilizes discharge current between electrodes in magnetic field. Extremely sensitive and accurate.

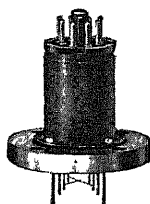
The Universal line includes two types of vacuum gauges of special interest to users of electron microscopes—the Universal highly sensitive cold cathode ionization gauge and the rugged Universal thermocouple gauge.

Both gauges are standard equipment on R.C.A. electron microscopes—and can be supplied for other high vacuum work.

Universal offers a complete production service in special glass and tube work—including metal-to-glass seals of all types and sizes. Your problems will receive our immediate and courteous consideration.

THERMOCOUPLE GAUGE

Measures low pressure levels with millivoltmeter which indicates variation in thermocouple voltage due to changes in vacuum. Ideal for systems requiring rapid verification of high vacuums. Heater and instrument terminals fit standard 8-prong tube socket.



UNIVERSAL X-RAY PRODUCTS INC.
1800-H N. FRANCISCO AVE., CHICAGO 47, ILL.

BIOLOGY

Normal Foot Lengths

► THE HUMAN foot seldom reaches the proverbial 12 inches in length.

Although the record for big feet for normal adults is 12.4 inches (for a Negro man) and for the smallest feet is 7.6 inches (for an Indian woman), the average foot length for white men is 10.3 inches, Dr. Howard V. Meredith of the Iowa Child Welfare Research Station, University of Iowa, reports in *Human Biology*, (December).

Adult Negroes have longer feet than whites, and American Indians have shorter feet. A foot 10.7 inches long is normal for Negro men, 9.9 inches for male American Indians. The foot length of women for the various races averages 9.7 inches, 9.3 inches (for whites) and 9.0 inches respectively.

Women attending college a half century ago had smaller feet than women students today, their feet averaging 9.2 inches as compared with the present length of 9.4 inches. Likewise the feet of men in college from 1880 to 1910 were, on the average, two inches shorter than they were for the period 1920 to 1940.

The growth of a human foot slows greatly from the period before birth to early adulthood. Foot length doubles in one month during the fourth month before birth, but it takes nine months to double its length three months before birth. It takes four years to double the length it is at birth and eight years to double the length it is at six months. It is 18 years before a boy's foot is twice as long as it is when he is a year and a half old, Dr. Meredith found.

All of the information on human foot length for inhabitants of North and Central America currently accessible, including data from seven previously unpublished studies, were assembled by Dr. Meredith in an attempt to answer questions popularly asked about the development of the human foot.

While the average woman has shorter feet than the average man, at all ages from infancy to adolescence a woman's foot is nearer adult size than is a man's. At birth, white females have attained approximately 34% of their foot length at maturity, white males only 31%. At ten years of age girls have attained 90% of their eventual foot growth, boys only 82%.

Individual differences in foot length do not exceed half an inch during the several months preceding birth, and dur-

ing the first year after birth they do not exceed one inch. The length of feet of ten-year-old children normally vary about two inches, and in adulthood feet may vary three inches in length.

The human foot may be identified without a microscope between five and six weeks following fertilization, although at that period the feet still lie approximately along the same axes as the shafts of the legs and there is no heel contour, Dr. Meredith states. By eight weeks individual toes are visible and the contour of the heel is indicated. At birth, baby boys have feet 3.2 inches long, and the feet of baby girls are about 3.1 inches.

Science News Letter, March 3, 1945

The syrup made from sweet sorghum contains twice as much iron as sugar cane molasses.

Facts ABOUT



BLOOD PLASMA

— — — LISTEN — — —

"ADVENTURES IN
SCIENCE"

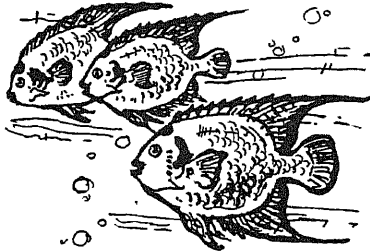
WITH

WATSON DAVIS

Guest: Dr. G. C. Robinson
SATURDAY, MARCH 10

2:15 EWT—CBS

Science Service Radio Feature



Unprofitable Islands

► UNCLE SAM is due to fall heir to a lot of scattered parcels of real estate, out in the Pacific. The Gilberts, Marshalls, Marianas and other groups of small Pacific islands over which we have progressively gained military control in the past year or so, will doubtless become our permanent responsibility in some form or other. Either they will be mandated to us by a new international organization, or we shall acquire outright ownership of them.

A few—one or two of the choicest out of each group—will be developed as commercial air bases and as military-naval strongholds. They will be worth all of the money we have lavished on them in war, and all we shall add for peacetime use and security.

Most of the rest are likely to become plain administrative headaches. None of them has any mineral resources, for without exception they are either masses of lava or pancakes of coral rock and sand. Only the largest islands, like Guam or Saipan, have good soil in large enough tracts to justify the establishment of plantations for the production of sugar or other subtropical crops. Practically all of the smaller islands are sparsely inhabited, for the simple reason that it is hard to scratch out a living of even the simplest sort on them.

If Micronesia is not to become a permanent drain on the American purse, we shall have to do some research and planning for economic uses that will make the area as nearly self-supporting as possible. And we should begin at least to outline such research right away.

Two possibilities suggest themselves. One is fish. The waters around many of these islands are full of tropical fish.

Some of these are known to be good food, but the usefulness of the others is still an unknown quantity. Fisheries men should be given a chance to look into this without delay—the more so with the world now facing a serious protein shortage.

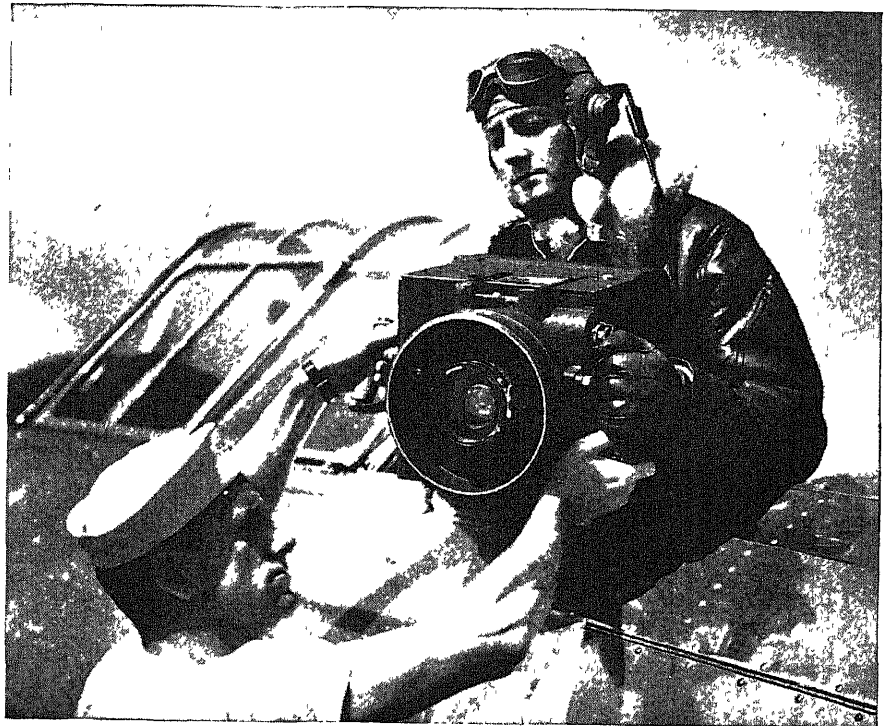
The second possibility is the production of subtropical and tropical fruits and oil seeds ashore, even without deep and fertile soils. Some of the best orange groves in Florida stand in soil that is practically pure sand; carefully adjusted applications of fertilizer feed their roots. Something

of the same kind might well be tried on these islands. The next decade may well see the world's biggest development of hydroponics, far out in the Pacific.

Science News Letter, March 3, 1945

Goose barnacles have been found on the humpback whale, but they do no damage except to impede swimming.

Whisky, after a lapse of five years, is now in production again in Scotland to an extent of about one-fourth the prewar quantity.



B&L Altimar f:4 lens in Fairchild (F-56) Aerial Camera.

From 65° Below to 160° Above . . . No Lens "Blackouts"



To maintain the definition that will reveal individual railroad ties from an altitude of five miles, each lens element in our Army's and Navy's high flying aerial cameras has to represent the highest of precision optical standards. In addition, the cement that holds these elements together must be resilient enough to withstand frequent extreme changes in temperature without dissolving, melting, or crystallizing . . . temperatures ranging from the extremes of stratosphere cold to desert heat.

That's why Bausch & Lomb chemists developed the low-temperature lens cement that is used today in many of the optical instruments Bausch & Lomb makes for our armed forces and which, in the postwar

world, will assure you of better, longer lasting optical equipment.

Whether you are planning the future purchase of new optical instruments or enlarged usage of your present equipment, it will pay you to discuss your optical problems with B&L now . . . to acquaint yourself with the products of continuing research and development here at optical headquarters. Bausch & Lomb Optical Co., Rochester 2, N. Y.

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Makers of Optical Glass and a Complete Line of Optical Instruments for Military Use, Education, Research, Industry, and Eyesight Correction and Conservation

SEISMOLOGY

Used Like Radar

Earthquake waves yield information about earth structures buried so deeply that human eyes can never see them.

➤ AS BRIGHT spots on the radar screen tell observers of the presence of aircraft, ships and other objects impossible to see because of darkness, fog or smoke, so the size and shape of the wriggly curves written by a seismograph instrument when an earthquake occurs yield information about earth structures buried so deeply that human eyes can never see them.

How earthquake waves are used by scientists for probing earth's inner secrets was described by Dr. James B. Macelwane, S.J., director of the Institute of Geophysical Technology in St. Louis, in a lecture before the University of Cincinnati chapter of the Society of the Sigma Xi, the scientists' national honor society.

Earthquake waves change their character and rate of travel according to the density and elasticity of the rock in which they travel, Dr. Macelwane explained. Making use of knowledge that has been accumulated in this field during a couple of generations, and correlating data collected from many seismological observatories, scientists have been able to construct a three-layered earth.

Under the relatively thin crust of surface rocks there is an outer shell or mantle some 600 miles deep, in which the speed of earthquake waves increases rapidly with depth. Under this lies an intermediate shell or inner mantle at least 1,100 miles deep, in which the rate of speed increase with depth is very much slower. Finally, there is a core of dense material, about six-elevenths of the earth's total diameter. This acts on earthquake waves like a spherical lens, focusing those that pass through it into "a bright spot surrounded by a dark band on the opposite side of the earth."

Dr. Macelwane also spoke briefly of the work of seismologists in the practical fields of prospecting for ores and minerals and feeling out the bedrock when engineers are selecting sites for dams, bridges and other massive structures. One favored method is to start small artificial earthquakes with explosive charges, picking up the waves that are reflected off the sides of underground hills and valleys of denser rock. Other geophysical prospecting methods involve the measurement of earth electricity, local variations in the magnetic field, and detection of differences in earth radioactivity.

Dr. Macelwane is president of the Jesuit Seismological Association, which cooperates with the U. S. Coast and Geodetic Survey and Science Service in the rapid determination of earthquake epicenters. At the time of the recent great earthquake in Japan, on the fourth anniversary of Pearl Harbor, this cooperative setup was able to get a close "fix" on the epicenter in less than 24 hours.

Science News Letter, March 3, 1945

ENGINEERING

New Heaters for Buses May Use Air Conditioning

➤ ENGINE water will probably not be used to heat the postwar motor coach. This system will be replaced by new air conditioning, W. W. Churchill, of the Washington Motor Coach Company, announced.

Present systems of heating buses frequently do not distribute the heat thor-

oughly and uniformly, and also they permit gas fumes and smoke from cigarette smokers at the rear of the bus to travel the full length of the coach, he said.

"It is my recommendation that air conditioning engineers give consideration to the arrangement of two or more small 'package' air-conditioning units similar to the type used in the average home refrigerator," Mr. Churchill remarked.

These air conditioning units, he pointed out, could be located at several points around the interior of the bus. Should one fail, the bus could be cooled by the other units.

In winter, similar independent heater units could be used to keep the bus warm, he stated.

Science News Letter, March 3, 1945

CHEMISTRY

Un-Sticking Wheat Starch By Use of Sulfur Dioxide

➤ FOR a new process for making wheat starch, two U. S. Department of Agriculture chemists, Dr. C. T. Langford and R. L. Slotter, of the Northern Regional Research Laboratory at Peoria, Ill., have been granted patent 2,368,668. Wheat starch has always been troublesome to manufacture because the principal wheat protein, gluten, swells up when wet and forms a sticky, doughy mass, very hard to get rid of. The two chemists have overcome this tendency by adding sulfur dioxide to the processing water. This forms a weak solution of sulfurous acid, which takes the stickiness out of the gluten and releases the starch grains from its grip. Rights in the patent have been assigned royalty-free to the government.

Science News Letter, March 3, 1945

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• Books of the Week •

➤ **HANDBOOK OF PLASTICS** — Herbert R. Simonds and Carleton Ellis—*Van Nostrand*, 1083 p., illus., \$10, sixth printing.

➤ **MANOMETRIC TECHNIQUES AND RELATED METHODS FOR THE STUDY OF TISSUE METABOLISM**—W. W. Umbreit and others—*Burgess*, 198 p., paper, illus., \$3.50.

➤ **PROCESS EQUIPMENT DESIGN**—Herman C. Hesse and J. Henry Rushton—*Van Nostrand*, 580 p., illus., \$7.50.

➤ **THE ROLE OF HIGHER EDUCATION IN WAR AND AFTER** — J. Hillis Miller and Dorothy V. N. Brooks—*Harper*, 222 p., \$2.50.

➤ **THE SOUTH AMERICAN HANDBOOK, 1944, a Year Book and Guide to the Countries and Resources of South and Central America, Mexico, and Cuba**—Howell Davies, ed.—*H. W. Wilson*, 798 p., illus., \$1.25.

➤ **TELESCOPES AND ACCESSORIES**—George Z. Dimitroff and James G. Baker—*Blakiston*, 309 p., illus., \$2.50 (The Harvard Books on Astronomy).

Science News Letter, March 3, 1945

MEDICINE

Arthritis Findings Help Explain Pain, Tenderness

➤ **NEW FINDINGS** in rheumatoid arthritis which "offer an explanation of the pain, tenderness, nutritional changes and muscular wasting generally seen in arthritis patients are reported by medical scientists of Detroit (*Science*, Feb. 23).

The doctors signing the report are Drs. Hugo A. Freund of Harper Hospital, Gabriel Steiner of Wayne University College of Medicine, Bruno Leichtenritt of Eloise Hospital, and Maj. Alvin E. Price of the Army Medical Corps, formerly of Detroit and now with the 17th General Hospital.

The findings consist in little knots or nodules widely distributed in the skeletal muscles and the peripheral nerve trunks. These little knots are inflammatory in nature. They are found in very small amounts of muscle tissue taken at random from various parts of the body of arthritis patients.

The large numbers found led the doctors to conclude that there must be an enormous number of them in an active case of rheumatoid arthritis. Some of the muscle nodules were big enough to be seen with the naked eye but others were so tiny they could only be seen with a microscope.

The nerve nodules were found in the connective tissue sheath surrounding the nerves. They were often removed from

involved joints and in nerves not connected with joints.

The frequency of signs suggesting nerve involvement in rheumatoid arthritis and the lack of information on this in previous scientific reports led the doctors to make a special study of the nerves in arthritis patients. Discovery of the inflammatory nodules in the muscles was made when they had an opportunity to study the amputated legs of a young woman suffering from rheumatoid arthritis. Specks of muscle punched out of patients who did not have arthritis showed no signs of these nodules.

Science News Letter, March 3, 1945

HORTICULTURE

Roses Keep Petals Longer If Cut in Late Afternoon

➤ **DON'T CUT ROSES** early in the morning, while the dew is still fresh on them, if you want them to last long. This advice, directly contrary to traditional practice, is based on experiments performed in Ithaca, N. Y., by Joseph E. Howland, Cornell University floriculturist.

Using a thousand roses, in tests extending over a year's time, Mr. Howland found that roses cut in the afternoon last as much as 10 hours longer than those cut in the morning. Roses keep nearly eight hours longer when cut at 4:30 p. m. than when cut at 8 a. m., he discovered. During hot weather, the afternoon cutting served to increase the

keeping time to nearly ten hours longer.

This is true because leaves make sugars when the sun shines. The later in the day the stems are cut, the longer they should keep because of the increased sugar content, which is highest around 4:30 p. m.

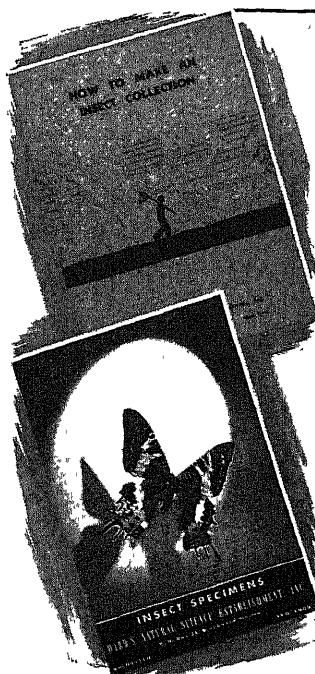
The Cornell investigator became interested in the problem of making roses last through similar research on cutting hay at the university. It was found that cutting in the late afternoon resulted in more hay of higher quality than when cut in the morning with dew on the hay.

Short-stemmed roses with only a few leaves keep just as long as long-stemmed ones with many leaves, Mr. Howland found.

The history of roses supports the new evidence. As early as 1908, Mr. Howland says, French investigators discovered that the keeping quality of cut flowers was not improved by any chemical used in the water, unless it was used in combination with sugar. Even today florists sell "sugar powder" to prolong the life of roses, but up to now they did not know why it worked.

Sugar alone cannot be used in the water because bacterial growth would be increased, and possibly plug water-conducting elements in the stem of the cut flower. A chemical which prevents rapid bacterial growth in the water must be used with the sugar. A large supply of sugar in the leaves and petals helps prevent their premature fall.

Science News Letter, March 3, 1945



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• New Machines and Gadgets •

⚙️ **LIPSTICK CASE**, with a window of transparent plastic in its side, the shape and size of a lady's lip, permits the buyer to see if the shade and color are exactly suitable.

Science News Letter, March 3, 1945

⚙️ **ICE AND SNOW** in freezing weather are eliminated by the use of heating coils of wrought iron installed under a concrete footpath at one factory, and under the loading strip of another. Hot water and low pressure steam are employed in these outdoor applications of "radiant heating," now used in many homes.

Science News Letter, March 3, 1945

⚙️ **GAS PURIFIER**, to remove oxygen from such gases as hydrogen, nitrogen, argon and neon in laboratories and industrial plants, including manufacturers of radio and radar tubes, uses palladium as a catalyst enclosed in metal cylinders through which the gas flows under pressure. High purity of gases is obtained.

Science News Letter, March 3, 1945

⚙️ **PLATINUM thermocouples** measure accurately temperatures of molten metal up to 3200 degrees Fahrenheit. The immersion head, shown in the picture, is composed of a platinum and platinum-rhodium thermocouple inside a fused silica tube in a block of graphite. In use



it is attached to a long tube containing connection wires.

Science News Letter, March 3, 1945

⚙️ **SLEEP CAP** for persons prevented from sleeping by noises is made of a light, open-work fabric fitting the head like a hood, with removable soft pads to cover the ears. The pads are designed to

distribute the pressure on the outside ear so that no discomfort is experienced.

Science News Letter, March 3, 1945

⚙️ **SLEDS** for ski-troopers and trappers utilize skis for runners and ski poles as load-supporting devices. Other parts of the framework are easily carried in a small pack when the sled is taken apart and the skis and poles used to fill their ordinary function.

Science News Letter, March 3, 1945

⚙️ **AUTOMOBILE JACK**, easy to use and economical to manufacture, has an upper end that in use is secured between the rim and brake drum of the wheel of the vehicle. The shank of the supporting stand is arched to pass inside the tire.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 248.

Science News Letter, March 3, 1945

Question Box

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What new dive bomber was used in blasting Japan during the recent carrier-based raids? p. 136.

What will be most effective in the improvement of aviation in the near future? p. 133.

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RADIO

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Where published sources are used they are cited.

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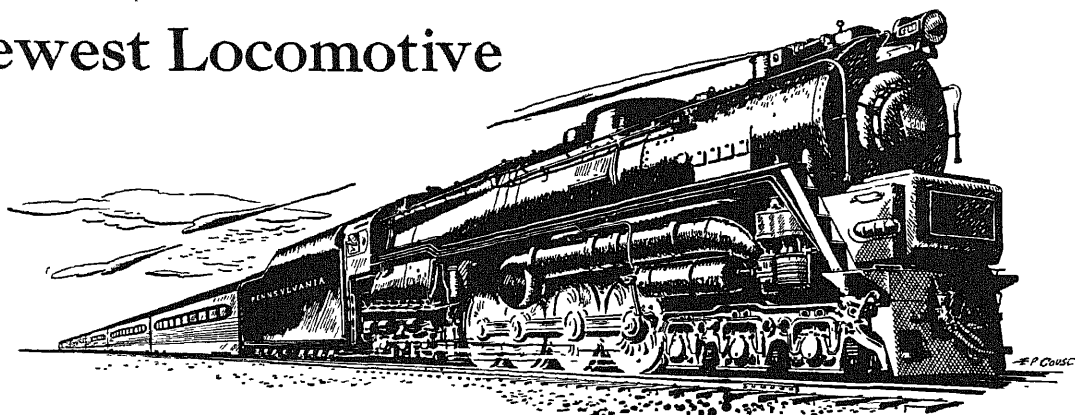
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Light for the Future
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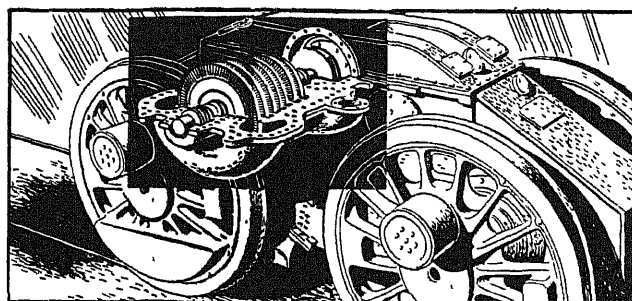
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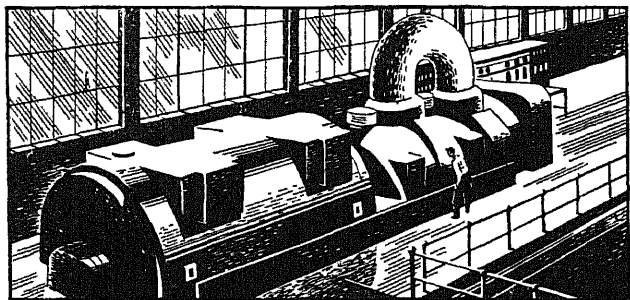
is Powered Like a Battleship



LONG AGO successfully developed by Westinghouse for ocean vessels, the *steam turbine* has now been harnessed as a brand new type of smooth, efficient motive power for modern railroad locomotives.



THE WESTINGHOUSE steam turbine in the Pennsylvania Railroad's new direct-drive locomotive is *no bigger* than a household electric refrigerator—yet it will haul long passenger trains with ease.



THE POWER-PACKED locomotive turbine is a descendant of giant Westinghouse turbines which generate much of the electricity used today. The great expansion of electric power began with these turbines.



THE VELVETY FLOW of power from this 6,900 horsepower *steam turbine* locomotive will make trains run with extra smoothness and is a major contribution to finer transportation for the future.

THE RAILROADS are developing a dazzling new kind of transportation for the future. The latest and most dramatic improvement is *steam turbine* power, which gives the Iron Horse "new lungs."

To help produce this new locomotive, the Pennsylvania Railroad, a long-time pioneer in transportation improvements, turned to Westinghouse and the Baldwin Locomotive Works. Working as a team, these companies have produced this latest in a great line of

steam locomotives—descended from "Old Ironsides," built by Matthias Baldwin in 1832. *Westinghouse Electric & Manufacturing Company, Pittsburgh 30, Pennsylvania.*

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MEDICINE

'Flu Viruses Alike

Grown on two widely different kinds of living tissue, chick embryos and mouse lungs, they have been shown chemically and physically identical.

➤ INFLUENZA viruses grown on two widely different kinds of living tissue, chick embryo and mouse lung, respectively, have been shown chemically and physically identical in experiments conducted at the Rockefeller Institute for Medical Research, by Dr. C. A. Knight. This evidence of identity, obtained for the first time on viruses that prey on animal hosts, has considerable practical value from the medical standpoint, for it gives reassurance that vaccines for human diseases cultured on media of non-human origin can be left essentially unchanged by possible influences of their alien hosts, and still have disease-preventing value when re-introduced into the human system.

The virus used by Dr. Knight in his crucial experiments is a strain of human influenza listed as PR8, because it is one of a series that was isolated during an epidemic in Puerto Rico. It has been kept going in the laboratory, for research purposes.

Dr. Knight first planted the virus in incubating hens' eggs—a procedure that has now become standard in propagating various causal agents of disease. He separated out a purified fluid containing the active principle, and accumulated a

considerable quantity of it. He also cultured the same virus in the lungs of laboratory mice, and after painlessly killing the animals extracted and purified the fluid from that source.

Careful laboratory comparisons by both chemical and physical means indicated that the viruses collected from these two widely diverse sources are alike in all essential respects. The mouse-lung strain, when cultured on chick embryos, apparently behaves exactly as does the strain that has been fed on chick embryo all the time. Finally, examination with the electron microscope shows the spherical particles that appear to be the "bodies" of the virus to be identical in appearance.

Chemical and physical identity between strains of tobacco mosaic, a plant-disease virus, was demonstrated in the Rockefeller Institute laboratories some years ago by Dr. W. M. Stanley, but until now a parallel proof in the case of an animal virus has not been possible.

Dr. Knight gives a condensed summary of the technical details of his work in *Science*, (Mar. 2), and states that a longer discussion will soon be published elsewhere.

Science News Letter, March 10, 1945



MOURNING CLOAK—This butterfly has the unusual habit of hibernating during the cold winter months. Its favorite sleeping location in cold weather is under the loose bark of a tree. The first warm days in March usually bring him out into the sunshine. Photograph by George A. Smith.

It pours through the vents into the engine, where it is compressed by a swiftly turning impeller. At very high altitudes the air will be as cold as 75 degrees below zero Fahrenheit. The air is whipped by the impeller to a combustion chamber, where the aviation kerosene burns furiously. This causes the air to expand as a hot gas and increases its velocity. The gases then pass through a red-hot turbine wheel, which is connected by a shaft to the impeller-compressor. Finally, the blast passes out through the jet exhaust at the rear tip of the plane, giving tremendous forward thrust.

The improved jet motor on the P-80 makes virtually no vibration. This reduces the fatigue on the pilot. Although the pilot hears no noise from the jet while in flight, a rumbling roar, like a baby thunder, passes out the rear. Another advantage of the new jet motor is that it requires no warm-up. It develops more than enough power for a take-off in less than a minute.

The P-80 has a new type of wing with a knife-like leading edge and other aerodynamic innovations that master the problems encountered when the speed of sound is approached or surpassed. The cockpit is located forward of the wing, and the pilot gets fine visibility through a plastic bubble canopy. The cockpit is pressurized so that the pilot can fly above 30,000 feet without use of an oxygen mask. The Shooting Star is also equipped

AERONAUTICS

Fastest Fighter

Known as the "Shooting Star," the P-80 gives the Allies supremacy in the field of jet-propelled aircraft, Gen. Arnold discloses.

➤ THE ALLIES hold supremacy in the field of jet-propelled aircraft, reports Gen. H. H. Arnold, commanding general of the U. S. Army Air Forces, in disclosing first facts about the P-80, the fastest fighter in the skies.

The P-80, built by Lockheed, and developed with the aid of the Air Technical Service Command at Wright Field and British engineers, is known as the "Shooting Star." The P-80 can fly as far as any of the conventional pursuit ships in use today. This solves one of the major

problems of design in jet-propelled airplanes.

Powerful armament is located in the nose, for the most effective concentration of fire power. The airplane is powered by General Electric's turbo-jet engine installed in the tail of the sleek plane. This engine of simple design produces more than twice the power of earlier models built for the AAF.

Air for the jet engine in the Shooting Star rams into vents in front of the wings, almost flush against the fuselage.

for anti-G suits, which help prevent a blackout of vision during sharp turns and pullouts.

Small and lightweight, the new plane is extremely maneuverable through use of a hydraulic aileron boost and electrically operated flaps. It can carry heavy loads of ammunition, bombs and fuel, as well as photographic equipment for

aerial reconnaissance. The simplicity of its design eliminates most of the controls found in a conventional reciprocating-engine airplane.

The entire surface area of the new jet plane is lacquered to a high polish. This reduces the air resistance still further and gives it the appearance of a skyrocket of death cutting through the skies.

Science News Letter, March 10, 1945

AERONAUTICS

Many Uses for Helicopters

When perfected, they may aid power and oil line inspectors, aerial photographers, and find other industrial and governmental activities.

➤ WHEN the helicopter is ready for the public it will find many uses in industry and government, as well as in civilian activities, Charles I. Stanton, Deputy Administrator of the Civil Aeronautics Administration, stated in an address before the American Helicopter Society in Bridgeport, Conn. He declared that the CAA is encouraging and fostering civil aviation and in this respect it is not ignoring the helicopter.

He pointed out that the helicopter may perform many industrial jobs already planned for fixed-wing airplanes, and in many cases it will do them better. Certain types of photography, particularly low-level shots of single buildings, can be done best from a stationary vehicle in the air, he said.

"Dusting of small areas such as stagnant pools, small fields surrounded by high obstructions and other pocket-like areas falls automatically into the performance ability of the helicopter," Mr. Stanton commented.

Aerial inspection of power lines and oil lines, and the transportation of repairmen to the scene of damage can be accomplished by the helicopter, he suggested.

As still further illustration of the versatility of the "flying windmill," Mr. Stanton stated that in the widespread range country of our western states, the helicopter may be used to spot cattle on the range, locate lost herds, and take censuses of wild animals. It can also be used in hunting coyotes.

Lakes so deep in the forests that they are still unknown to the fisherman's rod can become the long-sought vacation spots of sportsmen who own helicopters. In the duties of national conservation, the helicopter can be used as a flying senti-

nel over our national forests. It can help extinguish forest fires by permitting fire-fighters to drop bombs filled with fire-smothering chemicals into the heart of the flames

"Everyone from the Greyhound Bus Company to the owners of a single taxicab decided that the helicopter was the answer to their plan for the future," Mr. Stanton remarked in speaking of the possible uses of the craft for feeder line service.

He declared that he did not know how soon the problems confronting helicopter engineers could be solved.

"We realize that although the helicopter has gained tremendous impetus from the demands of war, it is also being retarded in certain directions, because of military expediency. We know that the present models are not for the inexperienced private pilot; and we know that they demand too much expert maintenance for general utility," Mr. Stanton explained.

Science News Letter, March 10, 1945

MEDICINE

More Medical Societies Cancel Annual Meetings

➤ AMERICA'S oldest medical society, the American Psychiatric Association, and many medical societies younger than this 101-year-old organization, are cancelling annual meetings scheduled for this year, the action being taken in cooperation with the war effort.

The American Orthopsychiatric Association, the Society of American Bacteriologists, the Federation of American Societies for Experimental Biology which is made up of six scientific societies, and the American Public Health Association

are the most recent to announce annual meeting cancellations.

Members of these societies have all been contributing to the war effort both through fundamental research leading to advances in medical treatment and through application of these advances for the protection and healing of our fighting forces.

The American Psychiatric Association has held meetings every year since 1844 except in 1861, when it was recorded "no meeting held on account of the disturbing conditions of the country." The Federation has cancelled its meetings each year during this war since 1942.

Science News Letter, March 10, 1945

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MEDICINE

Mass Epidemics

Almost all troops based in the Pacific in the early phases of the war suffered from one or more diseases, it is disclosed by recent report.

➤ ALMOST all troops based in the Pacific in the early phases of the war suffered from one or more epidemic diseases, Comdr. James J. Sapero and Lieut. Comdr. Fred A. Butler of the Navy Medical Corps report, (*Journal, American Medical Association*, March 3).

"A series of outbreaks of tropical diseases in epidemic proportions of a magnitude and potential threat seldom if ever exceeded in American military history" is how they describe what happened as our forces began occupation of numerous islands to stem the Japanese 1942 advance.

From the lessons learned in this phase of the war, however, the epidemic diseases were soon brought under control.

"History," the two Naval medical officers believe, "will in time show that Allied success in disease control so greatly exceeded that of the Japanese that a major advantage in the war was thereby gained."

The most significant diseases which plagued the troops in New Caledonia, the New Hebrides, the Solomons, the Fiji Islands, and the Ellice, Samoan and Tonga Island groups were, in order of importance, malaria, dysenteries, dengue, Bancroft's filariasis, scrub typhus and infectious hepatitis. Bancroft's filariasis appeared in epidemic form in troops for the first time in history.

Military expediency and in some cases ignorance of methods of controlling these diseases were chiefly responsible for the early epidemics, it appears.

The initial occupation had to be made with such speed that there was no time for carefully considered plans of disease control. Also, the entire effort of the newly occupying force had to be turned toward even more urgent matters such as getting food and ammunition and digging in to fight the enemy.

Even though the newly occupied islands were known to be centers of "an impressive array of threatening diseases," many of them presented problems of control with which most medical officers were totally unfamiliar. In some cases the mechanics of how the diseases spread was not known to medical science.

One "small heroic group," for example,

went into a region they did not even know was malarious. They had no entomologist with them to point out the breeding habits of the particular mosquitoes that spread malaria in that region. They put on a gigantic program of quartering, raking and burning coconut half shells and swamp draining, only to learn later that the particular malaria mosquitoes of the region did not breed in the swamp, seldom if ever bred in coconut half shells and actually were breeding in a small, harmless-looking stream.

The filariasis epidemic was totally unexpected. During the 40 years in which a naval station had existed at American Samoa, not a single case of this disease, with the dreaded end result, elephantiasis, had been reported in naval personnel. Subsequent discovery that the chief mosquito carrier of this disease would be found only within short distances of native villages which were the source of the infection showed the way to control this threat. In the early days of the war, however, troops were sent to some of the islands in such numbers that it was impossible to quarter them at safe distances from the natives and there was not always time for adequate mosquito control measures.

Unlike malaria and dengue, little progress has been made in preventing or controlling dysentery which plagued troops initially on every landing, the Naval officers report. Flies seemed to be the chief trouble-makers but usually before anti-fly measures could be taken, the epidemic had done its damage.

Amebic dysentery did not appear in epidemic form but how many low-grade chronic infections will appear in the future is "a matter for speculation."

Science News Letter, March 10, 1945

DENTISTRY

Immunity to Tooth Decay May Come From Ammonia

➤ IMMUNITY to tooth decay, or caries, comes from tiny amounts of ammonia continuously present in the mouth, it is suggested by findings reported by Dr. Robert G. Kesel, Joseph F. O'Donnell



HYDRAULIC HOIST—This is the method used in a helicopter air-sea rescue system. It consists of a pump and motor each about the size of a man's hand—which was found capable of lifting and controlling a load at two and one-half feet. Official U. S. Coast Guard photograph.

and Ernst R. Kirch, of the University of Illinois Colleges of Dentistry and Pharmacy in Chicago, (*Science*, Mar. 2).

The ammonia is present specifically in the patch of material on the tooth surface which acts as lodging for bacteria, known as the bacterial plaque. The ammonia comes from a small group of amino acids, protein building blocks, which are in the mouth as a result of the type of diet and body metabolism, the scientists report.

The lucky persons who are immune to caries have in their salivas enzymes capable of producing ammonia from certain amino acids, according to the findings of the Illinois group. Many enzyme systems were also found in salivas from persons with actively decaying teeth, but in most instances these salivas did not have an enzyme system capable of converting glutamic acid to ammonia.

The presence of ammonia in saliva was reported some years ago by another group of scientists, Drs. C. T. Grove and C. J. Grove. Its significance, however, was not appreciated. Search for the reasons why persons without tooth decay have no acid-forming bacteria in their mouths and why their salivas do not rapidly convert sugar into acid led the Illinois group to discovery of the role of ammonia.

Science News Letter, March 10, 1945

GENERAL SCIENCE

Science Talent Institute

Forty boy and girl winners in the Fourth Annual Science Talent Search, during honor-trip to Washington, are addressed by leading scientists.

See Front Cover

► THE YEAR'S talented young scientists of America attended the five-day Science Talent Institute in Washington (March 2-6) as the culminating event of the Fourth Annual Science Talent Search for the Westinghouse science scholarships. This educational event is conducted by the Science Clubs of America, administered by Science Service.

This issue of SCIENCE NEWS LETTER reports some of the highlights of the sessions. The next issue will continue this report.

The picture on the front cover of this SCIENCE NEWS LETTER shows Dr. S. G. Hibben and a group of the winners after his talk on "Lighting Tomorrow," given before the Science Talent Institute

Rear Admiral J. A. Furer, Coordinator of Research and Development, United States Navy:

The war has not only brought science in civil life and the Armed Services together, but it has stimulated research to such a degree as to bring about speedy solutions to many important military and naval problems. It is this cooperative effort in research, plus speed, that has kept us ahead of the enemy in this complex technological war.

Scientists have invented new devices which make it possible for seamen to find their way on the ocean and to exact spots on distant shores under any condition of the weather. They are no longer dependent on celestial navigation, on lighthouses and on other aids to navigation in doing this. Range finding is no longer dependent on clear weather and optical instruments and gunnery has been so improved that ships at sea can demolish enemy gun placements on shore with the greatest precision. Rockets now make it possible to fire a great volume of high explosives on to the beaches from small boats, because the rocket has no recoil and does not require foundations like a cannon. But most important of all, the scientists and engineers joined forces in developing the means for getting large numbers of men and great

quantities of material of all kinds on to the beaches in an incredibly short space of time as compared to what was formerly possible.

Vessels for many purposes and various sizes all the way from 35-foot boats to 300-foot ships were specially designed and built to be run up on the beach. The idea of deliberately running ships up on the beach and discharging their cargoes from a huge port in the bow was a new one.

The great improvement made by scientists and engineers in the last ten years in the internal combustion engine for marine use has really made these special ships possible. Perhaps of even greater importance has been the development of amphibious vehicles such as the Alligator and the Duck. These seagoing trucks can take a load of men or materials from a ship ten miles out at sea, across coral reefs, through the surf, up on the beach and right on for miles inland to the unloading point.

The magnitude and speed of these operations are well illustrated by the assault on Saipan in which more than four regiments were put ashore on a single beach from over 700 amphibious vehicles in a matter of a few minutes, and within less than an hour tanks were being landed to support these men.

The scientists are doing a magnificent job. Without them the United Nations could not win this war. However, too many of these technically trained men are being put in uniform and assigned to duties that can be performed just as well by less talented men.

The core of the difficulty is that we have no adequate National Service Law. If we had had early in the war a true National Service Act it would then have been possible to keep the scientists at work on jobs that only they are qualified to do. Competent scientists are so few in number compared to the total population of the country that it is especially important that they be conserved for research work.

There were, for example, as of October 1, 1944, only about 4,500 physicists below the age of thirty in the United

States. Some of these men are in the armed forces and some are not. Very important research projects are right now slowed down and some have not been taken up at all because scientists and engineers in this age group have gone into the Services who should have remained in laboratories and in industry.

A true National Service Act would have made it possible to provide an opportunity for the four or five thousand boys with particularly outstanding aptitudes for science who reach the age of eighteen each year to continue their education. By providing for the education of this comparatively small number of talented youths, we would be doing much to insure our position in the scientific world ten years from now, otherwise we will be faced with a very serious shortage of scientists when that time comes.

Maj. Gen. James C. Magee, U. S. A., Ret., former Surgeon General:

The increase in our knowledge relating to the causes, the prevention and the treatment of diseases represents a notable triumph for medical research. The impetus given scientific investigation by the impact of war has served to focus thought particularly on problems of a military medical nature and to present them in sharp relief to our attention. This is as it should be, for the complete support of our fighting forces takes precedence over all other considerations.

The mobilization of scientific talent devoted to medical research in the past few years has been productive of enormous benefits to the military establishments and to mankind at large. It does not matter whether a specific bit of research had its genesis in a purely military demand or whether it had its origin in other sources; the results of the research are open to all. A very great degree of the success attained may fairly be ascribed to the policy which permitted the concentration of so much investigative effort in the Office of Scientific Research and Development and the Committees of the Division of Medical Sciences of the National Research Council. So successful has this policy been the government has wisely determined to carry the same activities into peacetime and an *ad interim* committee for research has been appointed to function until the establishment of a permanent body has been accomplished. We may hope with

great confidence that some of the many unsolved problems in medicine that still confront us may be attacked with the same vigor and concentration of talent

as were applied to wartime matter and that answers to some of those problems, at least, may be found.

Science News Letter, March 10, 1945

ENGINEERING

Uses Either Gas or Oil

Conversion from one fuel to another is made almost instantly in the new diesel engine which needs no electric sparking device.

➤ A NEW development in the diesel engine field permits the use of either gas or oil as fuel without any electric sparking device, saves from 20% to 25% in fuel consumption, and enables the change from one fuel to another without the necessity of a shut-down. It is a development of the Cooper-Bessemer Corporation.

Any engine built as a diesel can be fitted to operate on gas, but engines built purely as spark-ignited gas engines cannot be converted to work on the principle of the diesel. Conversion of diesels from one type of fuel to another has been possible in the past, but it has always been necessary to shut down and exchange major or minor parts. With the new development conversion is as simple as closing one valve and opening another, and it can be arranged so that the engine automatically goes from one to the other as the gas availability changes.

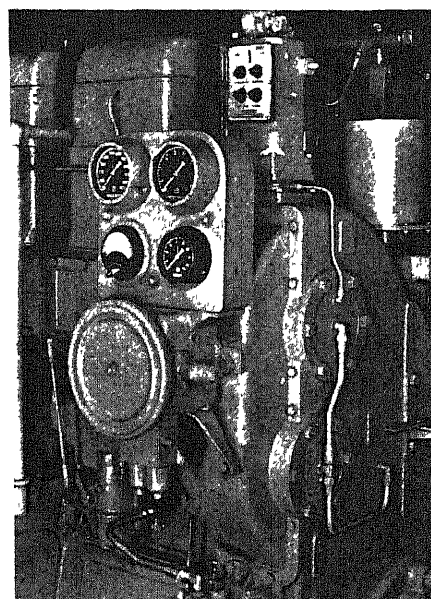
Seventeen years ago the company built a single-cylinder test engine on the diesel cycle to operate on gas. It used compressed air with the gas injected on top dead center under very high pressure,

It was found that while it was possible to run such an engine without other ignition means, the engine performed very much better if pilot oil injection was also used. This engine was not marketed.

No thought was given at that time to the possibility of allowing the gas to go in with the intake air, because of the assumption that it would pre-ignite. It is now found possible to admit the gas with the engine air intake and be free of any evidence of premature ignition. In fact, an engineer of the company states, on very heavy overloads with natural gas, the mixture will not fire without the pilot oil.

"Assuming a diesel oil engine in operation and on load," Ralph L. Boyer, Cooper-Bessemer Corp. engineer, says, "if gas is admitted in the intake air the governor obviously will immediately reduce the amount of oil to compensate for the percentage being carried in the gas. It then merely becomes necessary to reduce the fuel oil injection to the desired minimum and then govern the percentage of gas according to load."

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CONTROL END—This is the Cooper-Bessemer Type JS-8 Diesel engine, showing the gas-oil operating mechanism. This engine is rated 675 horsepower at 400 revolutions per minute.

broadcast of "Adventures in Science."

Plant scientists can offer you specific varieties of vegetables that have been created by plant breeders for better quality, higher yields, resistance to disease, and for other virtues of good garden crops, he stated.

Thanks to fertilizer technologists, Victory gardeners will have all the fertilizer they need, Dr. Cardon announced. Last year a new form of fertilizer nitrogen, granular ammonium nitrate, made up about a fifth of the nation's total nitrogen supply. We had ammonium nitrate before, but it attracted moisture so readily that it caked, sometimes even turned to liquid. Fertilizer scientists studied this problem and found a way to produce ammonium nitrate in very small pellets with a coating to protect them from moisture.

"Plan your garden for a long season," Dr. Cardon urged, "so that something fresh will be available from early in the spring until late in the fall. Home canning and storing plans should be included in garden plans. Vegetables you grow and can or store yourself don't cost you ration points. If you have any gardening problems, get in touch with your local Victory garden chairman or county agent. Planning your garden ahead will give you the most returns for your effort."

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HORTICULTURE

Home Grown Food

➤ HELPING to win the war isn't the only reason for having a Victory garden this year. You can save yourself money, too. By supplying your family with fresh vegetables for a whole season at little cost from even a small garden, you can grow the same vegetables that you would have to pay up to \$50 or more for on the market. Home grown food is tastier, too. Vegetables and fruits do have a better flavor when they are garden fresh, as they are when they come out of your own Victory garden.

Science will be the Victory gardener's unseen helper this year, more than ever before, to help produce more and better vegetables. Science can be brought into

your Victory garden from the moment you begin to plant your crops, reports Dr. P. V. Cardon, in charge of the Agricultural Research Administration of the U. S. Department of Agriculture.

"When you select the vegetables to plant in your garden you are applying at least two lines of scientific research. Scientists who breed better varieties of plants, and investigators who study nutritional needs may not seem to have much in common at first glance. Yet you are relying on recommendations made by both these groups when you choose your garden crops," Dr. Cardon pointed out, speaking as the guest of Watson Davis, director of Science Service, on the CBS

ELECTRONICS

"Scanner" Peers Through Steel in New Invention

➤ ELECTRON streams or gamma rays are used in the apparatus on which patent 2,370,163 was granted to Donald G. C. Hare of Roslyn, N. Y. It is intended to replace costly, high-powered X-ray tubes and slow-operating radium photography, now used in searching thick steel plates for hidden flaws.

Essentially, the device is very simple. A source of penetrating radiation is placed on one side of the steel plate, and a detector of such radiations on the other. Rays passing through the plate will have their intensity changed by blow-holes or other defects in the metal, and the changes will be recorded by means of appropriate amplification and electrical or photographic apparatus. The ray source and its faithful recording companion are moved back and forth, either on the opposite ends of a U-shaped yoke or on parallel tracks by means of synchronized motors, thus "scanning" every inch of the plate.

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AERONAUTICS-MEDICINE

Flying Ambulances Have Web Straps for Litters

➤ CARGO-CARRYING planes can be rapidly converted into flying ambulances through the installation of web straps from which to suspend litters. The new web strap suspension system takes the place of rigid metal framework that formerly hampered loading operations and presented a definite hazard to medical personnel moving about the plane in flight. Straps are more economical in weight and space.

Originally designed for use on the C-82 Packet cargo plane by Michael Cozzoli, project engineer of the Fairchild Engine and Airplane Corporation in co-operation with the Air Technical Service Command, Wright Field, the new method of litter suspension is now standard equipment in all large military ambulance planes, including the C-46 Commando, C-47 Skytrain and C-54 Sky-master.

Using the strap method, 34 litters can be set up in the C-82. Each tier of litters is suspended from the ceiling and hooked to fittings in the floor. Loops in the web straps at regular intervals accommodate the litter handles. A clamp attachment tightens the loop around each handle.

All litters are held in place against the

walls by brackets which are the same distance from the floor as the corresponding loops in the straps. The installation is permanent equipment with the airplane. When not in use the straps can be unhooked from the floor and rolled up into storage bags which are fastened to the ceiling. The equipment can be set up ready for use in less than two minutes.

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CHEMISTRY

Nylon Suit Protects Airmen in Frigid Waters

➤ AIRMEN dunked in near-freezing arctic waters in sub-zero weather after ditching their planes at sea may owe their lives to a new all-nylon anti-exposure suit that is coated with a substance to make it both water-tight and air-tight. Information regarding the substance itself was not revealed.

The protective cloth of the suit covers everything but the face. It was developed by the Personal Equipment Laboratory at the Air Technical Service Command at Wright Field. Under ordinary conditions an airman's survival in water 15 degrees above zero is a matter of minutes. It is reported to be one of the worst situations that a man can face.

During tests, airmen wearing the suit have spent an hour in water at very low temperatures. By use of thermocouples, scientists observed that at no time was any part of their bodies more than a few degrees below normal. The men themselves reported experiencing no real discomfort from cold.

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ORDNANCE

Tracer Elements Fixed on Separate Wad in Shotgun

➤ BODING ILL only to night-flying geese (or possibly also to night prowlers around chicken-coops) is a shotgun shell equipped with a number of luminous tracer pellets, the invention of Newland Knight of Mobile, Ala., patent 2,368,029. It differs from tracer shotgun ammunition heretofore proposed in having its tracer elements fixed on a separate wad that may be affixed to the front of an ordinary shotgun shell, instead of having them mixed with the main charge. The new method gives the user his choice of using tracer ammunition or not, without having to carry special shells.

Science News Letter, March 10, 1945



BIOCHEMISTRY

Penicillium Notatum Is Good Source of Vitamin D₂

➤ THE SAME MOLD, *Penicillium notatum*, that yields penicillin can be made a good source of rickets-preventing vitamin D₂ by irradiating it with ultraviolet light. Getting double value out of it in this way may help cut the cost of penicillin, it is suggested by three Swedish scientists, Dr. Ragnar Nilsson, Dr. Nils Olsson and Dr. Per Eric Nilsson, all of the Swedish Agricultural College at Uppsala.

The suggestion is made in a newly published memorial volume celebrating the sixtieth birthday of the eminent Swedish physicist, Dr. Thé Svedberg of the University of Uppsala. Copies of the book have just recently been received in this country.

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ASTRONOMY

White Dwarfs May Be Pulsating Stars

➤ WHITE dwarfs may be pulsating stars like the giant Cepheids, Dr. P. L. Bhatnagar of the University of Delhi reports in the British scientific journal, *Nature*. Although the pulsation may be too rapid to be observed directly, it may still exist in these exceptional stars which are of high temperature but still with "an average density so great as to be almost incredible—sometimes millions of times that of water. The period of the pulsation would probably be less than ten seconds.

There seems to be no theoretical reason why the rhythmic expansion and contraction of a star, so far observed only in giant and super-giant stars, should not take place in denser stars and even in white dwarfs where the atoms have been stripped of their electrons, Dr. Bhatnagar states.

After a white dwarf has been created by the sudden collapse of a star, it is quite natural that the star should be left pulsating, the Delhi astronomer believes. Even if the physical conditions do not favor maintaining such action of the star, Dr. Bhatnagar estimates, once started the pulsation might last for about 1,000 years before it dies out.

Science News Letter, March 10, 1945

THE FIELDS

HORTICULTURE

New Lettuce Variety Is Promised for 1946

► A NEW lettuce variety, valuable for summer use because it does not shoot up a flowering stalk and "go to seed" as soon as warm weather comes, is announced by the U. S. Department of Agriculture. Propagation stocks of seed are now being distributed to growers, and it is expected that enough seed for general planting will be available by the spring of 1946.

The new lettuce was developed by Dr. Ross C. Thompson at the Plant Industry Station at Beltsville, Md., a short distance outside of Washington. It has frilled, light green leaves with the very wrinkled surface known to horticulturists as "savoyed."

Gardeners refer to the "going-to-seed" process in lettuce as bolting. Because of its reluctance to do this, the new variety has been named "Slobolt."

Science News Letter, March 10, 1945

GEOGRAPHY

Australia's Future Meat Supply Is Endangered

► MEAT from Australia, now available in generous quantities to our troops in the wide Pacific war areas, through reverse lend-lease, faces an uncertain future because of declining yields of water from the artesian wells on which the country's entire pastoral industry depends; declares James E. Collier, University of Missouri geographer.

All of interior and western Australia is dry country, with annual rainfall of 20 inches or less. It is therefore incapable of development for high-yield agricultural purposes, and is best adapted for grazing cattle and sheep. Water for the livestock, both on the range and along routes over which the animals are driven to market, is supplied mainly from deep wells.

These artesian wells are failing. For a good many years, water has been taken out of the great underground reservoirs faster than new supplies have been trickling in. Many wells that used to be free-flowing have passed over into the sub-artesian category, requiring pumping.

Total number of artesian wells in Australia was about 8,765 at last counting,

as compared with approximately 2,200 in 1900, but the total present flow of water is estimated at only 340,544,000 gallons a day as compared with 673,752,000 gallons a day at the turn of the century. That is, despite a quadrupling in number of wells, the yield has fallen off to about half what it was 45 years ago.

Some artesian water sources remain untapped, Mr. Collier states, especially in the interior and western basins of Australia. However, the likeliest way to increase available water, in his estimation, is to conserve present supplies. Most of the water is now carried away from the wells in open earthen ditches, and this involves prodigious waste through seepage into the ground and evaporation into the always-thirsty desert air. Water-conserving installations may be expected to cost money, but with water constantly growing scarcer and more valuable the expenditures begin to appear economically justifiable.

Mr. Collier's facts and conclusions are presented in a report to the *Scientific Monthly*. (Feb.)

Science News Letter, March 10, 1945

CHEMISTRY

Simple Chemical Test Determines Butter Quality

► A SIMPLE chemical test has been developed to determine the quality of butter, to replace the ordinarily used method that depends on the human senses of taste and smell. A chemically pure fat solvent, saturated with a neutral red color, is used. Melted butter put in it brings out the red; the more rancid the butter, the stronger the color. The development is the result of work at the Cornell University Agricultural Experiment Station.

The chemical used is pure xylol. In the test, one cubic centimeter of milk-fat is melted in the xylol, which has been saturated with the neutral red color, and the resulting product compared with the different shades of red in a standards series. These standards contain known quantities of oleic acid, one of the acids commonly measured in butter. A strong red color after the processing indicates a strong rancid butter. The lighter the shade of red, the less the rancidity.

The new method may be used by creameries and butter dealers with only the simplest training. It may possibly be usable also in grading cream. It was discovered in 1942 by Prof. George Knaysi, bacteriologist, while working on types of fats in the cells of bacteria, and later applied successfully to butter by him.

Science News Letter, March 10, 1945

SOCIOLOGY

Expectation of Life Is Index to Social Progress

► THE LENGTH of life to be expected by a newborn baby, which has increased from 41 years in 1840 to about 62 years in 1930, has kept pace with scientific advancement during those years and is an index of social progress, Dr. Hornell Hart and Hilda Hertz of Duke University report in the *American Sociological Review*.

"High expectation rates," they say, "reflect good working conditions, long life, relative freedom from bereavement, health, high scales of living, efficient government, and effective education. Low expectation rates reflect early death, widespread bereavement, prevalence of disease, poverty, filth, vermin, political corruption or inefficiency, and ignorance."

The expectation of life in cities has increased much more sharply than life expectation in rural regions, it is pointed out. The progress has been going on for the past 400 years. Expectation of life has increased as much since 1800 as it did during the entire preceding 50,000 years, the scientists conclude.

Although present trends would indicate that no infant in the future could rely on living to more than from 70 to 75 years, they believe, there is no reason, they feel, why new discoveries such as a cure for cancer or the reasons for aging should not bring new and even more sweeping upsurges in life expectancy.

Science News Letter, March 10, 1945

ENGINEERING

Lamme Medal Awarded Soren H. Mortensen

► THE LAMME medal of the American Institute of Electrical Engineers has been awarded to Soren H. Mortensen, chief electrical engineer of the Allis-Chalmers Manufacturing Company, for his pioneer work in the development of self-starting synchronous motors and for his contributions to the development of large hydraulic and steam turbine driven generators.

Mr. Mortensen, a native of Denmark, was educated in that country and in Germany and came to America in 1903 for employment by the Westinghouse Electric & Manufacturing Company, and later by the Allis-Chalmers firm. He became chief electrical engineer of the latter company in 1942.

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METEOROLOGY

Conquering the Weather

Bomber's moons, thunderstorms, fog and ice are our allies as well as our enemies, ruthless as gunfire and often harder to out-maneuver than enemy pilots.

By ROBERT N. FARR

➤ BOMBER'S moons, thunderstorms, fog and ice aren't things that just "happen." They are part of a definite, predictable pattern of weather all over the world. They are our allies, and our enemies as well, ruthless as gunfire and often harder to out-maneuver than an enemy pilot.

Weather plays an important part in any war. The evacuation of Dunkirk was successful because fog was on the side of the Allies during a time when the Luftwaffe was trying to break it up. When the Japs raided Pearl Harbor, they rolled in behind a combination of rain, lightning and intense icing conditions that obscured their movements and contributed to their initial success. The Nazis used a blanket of bad weather last December to hide the movement of their troops as they prepared to push back Allied forces in Europe.

Many a strategic air and ground operation has been intentionally timed to conform with weather favorable to the tactical situation. The raid on the Gilbert and Marshall Islands was so planned that our planes left their carriers, made the raid and returned to their flat-tops under favorable flying conditions. The last plane had hardly been caught on the deck of its carrier before bad weather, which had been anticipated, set in and protected the carrier fleet from aerial reprisals until it was safely out of the combat zone.

Important Weapon

To our military leaders weather is as important a tactical weapon in war as an armada of bombing planes or a battery of fast-moving tanks. From Eisenhower, MacArthur, Patton, King and Nimitz straight down the line, our military and naval leaders know what weather is, what causes it and what influences it. Aerology, the science of meteorology applied to the upper air, is essential knowledge as long as men fly or fight.

Aerology is a difficult science because it is impossible to produce weather phenomena in a laboratory, even on a small

scale. World War I was a proving ground for many new aerological theories, one of the most important of which is the polar front method of weather map analysis, used to advantage every day where Americans are in action.

The atmosphere is like an envelope of gas extending nearly 200 miles above the surface of the earth. Through it move deep masses of air, like the currents in an ocean. Our lives depend upon this gas, because it contains the air we breathe. Flight also depends upon it, for it is the action of the wings of the airplane within this envelope of air that provides life which makes flying possible.

The atmosphere is composed of about 99 per cent oxygen and nitrogen, the rest being made up of minor gases, one of which is water vapor. All factors that make up weather, including clouds, rain, snow and ice, occur in the segment of the atmosphere nearest to the earth.

In the zone of weather there is a general flow of air over the earth's surface which follows a definite and fixed pattern. Cold air masses travel from the

polar regions. Upon being warmed up by contact with the surface of the earth, the air develops vertical currents, which give a pilot a bumpy ride in rough air. Warm air masses spread out from the area around the equator. A pilot flying in a warm air mass will encounter stable air.

When warm air and cold air meet, they do not mix readily. Each air mass tends to remain intact, with the cold air sliding beneath the warm air, or the warm air advancing over the cold. Warm air never crowds out cold, because of their relative densities, but it may replace cold air as the cold mass moves out. The sky becomes a battleground as clouds are formed which often result in rain or snow.

Warm air rises around the equator and cold air sinks at the poles, so that a "polar cap," an accumulation of a mass of cold air, builds up in the polar regions of the earth. When the pressure of this mass of air becomes great enough, the polar front is pushed down and begins to travel south. The leading edge of this polar front is a cold front, a boundary line between the cold and warm temperatures. This cold front is a weather factory which makes all kinds of weather and is very dangerous, although the



DIFFICULT FLYING—Clouds, clinging to air pockets between snow-capped mountains, make it hard for pilots to

MAGNIFICATIONS of 100 to 20,000 DIAMETERS

by a twist of a knob

X 20,000

X 17,000

The New RCA
Universal (Type EMU)
ELECTRON
MICROSCOPE

X 11,000

X 9,000

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X 2,500

X 1,200

X 700

X 100

The new RCA Universal (Type EMU) Electron Microscope is designed to provide (1) maximum operator comfort and convenience, (2) maximum simplicity and flexibility, (3) consistent top performance, and (4) maximum ease of servicing.

The operator of this microscope, by merely turning a single knob, can enlarge the clear, sharp image he is observing through 40 steps of magnification ranging from 100 diameters up to 20,000 diameters.

This is but one example of the ease with which this instrument can be used in practice. Making micrographs at any magnification is equally simple.

Detailed descriptions of the new RCA Universal (Type EMU), and the new RCA Console (Desk Model, Type EMC) Electron Microscopes are contained in the booklet shown at the left. Copy of this booklet will be sent promptly on request.



The new RCA Type EMU Universal Model RCA Electron Microscope, also the new RCA Type EMC-1 Console (Desk Model) Electron Microscope, are described and illustrated in this new RCA Bulletin. Copy sent promptly on request.



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Do You Know?

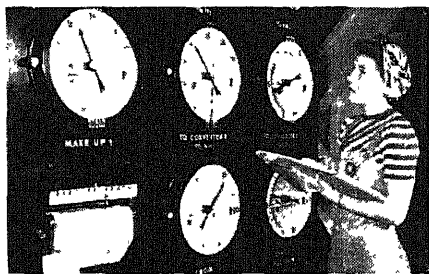
Sulfanilamide fed to laying hens resulted in many eggs without shells; *sulpyridine* had no similar effect.

Sweden plans a new *airfield*, located near Stockholm, for transatlantic traffic; it will have four runways each two miles long.

Shrimp, as taken from the water, look like small lobsters, but unlike lobsters have edible meat only in tail and abdomen; their tiny claws hold too little to be worth recovering.

The earliest *tin* object yet known was found on Lesbos island off the northwestern corner of Asia Minor at the entrance to the Dardanelles; it is a bangle of pure tin probably 4,500 years old.

Bagasse, or what is left of sugar cane when the juice is extracted, can be used for fuel, building and insulation material, raw material for alpha-cellulose, plastics, decolorizing char and other industrial purposes.



HOW T.V.A. NITRATE PLANT SPEEDS GAS ANALYSES

Gas Analyses, made automatically and continuously, are an important feature in the great, T.V.A. Nitrate Plant No. 2 at Muscle Shoals, Ala. Here nitrogen is extracted from the air and made available for explosives, fertilizer, etc.

Instead of having to run four titrations or other tests at the station, the girl from the Control Lab can see the four analyses at a glance, from the big-dialed instruments above. She logs the readings and goes on to the next station—the lab gets more readings, faster.

Micromax Gas Analysis Recorders can be used with a variety of gases such as ammonia, CO₂, acetone, H₂, SO₂, etc. If you will outline your specific problem, we will be glad to recommend suitable equipment.

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From Page 154

warm front presents many tough operating problems such as poor visibility, low clouds, freezing rains, over a large area.

The safest place for an aviator in a cold front area is at home reading a good book. But frequently a war mission calls for flying in a cold front area. Pilots in the Aleutian Islands sometimes pass through half a dozen cold fronts on their way out in a day's patrol, and pass through them again on their return to their base.

Storms scattered along the entire cold front, sometimes 2,000 miles long, are the meanest kind. A cold front is much longer than it is wide. It may be 50 to 100 miles wide. The trick of flying a cold front, therefore, is not to fly the long way, parallel to the front, but straight through it. Pilots say that if you are flying in a cold front more than 30 minutes, you are flying it the wrong way, since even in a low-powered plane you can cover about 50 miles in that time. The best way to recognize the presence of a cold front is to note when winds become gusty, the barometer jumpy and the temperature dropping with a bank of threatening clouds appearing on the horizon.

Cold fronts are most intense in the late fall, winter and spring, because at these seasons there are the sharpest contrasts in temperature between the masses of cold and warm air. The three principal dangers of flying through a cold front are visibility, turbulence (which may be violent enough to shake a plane out of the pilot's control and frequently is accompanied by a thunderstorm) and icing.

In the air, a thunderstorm looks like a head of cauliflower with an anvil on top of it. It is the color of dirty cotton. Some thunderstorms are 30,000 to 60,000 feet high, a towering mass of clouds containing ice mixed with rain, and sometimes hail. Lightning flashes, issuing from the most violent part of the storm, are a frequent first warning to pilots.

The anvil top, above the turbulent activity of the storm, is made up primarily of ice crystals. Hailstones, ranging in size from a pea to a baseball, form in the "chimney" of the thunderstorm. Experience has taught pilots that the best thing to do is to fly around a thunderstorm. If conditions prevent this, the next best thing to do is to fly above or below it. Finally, as a last resort, they fly through it.

Ice ordinarily exists in the air in cloud formations. The best rule for pilots is to stay out of clouds. The danger signal is the first trace of ice on the windshield. Ice forms in the air only when two things happen at the same time: when moisture is present in liquid form, and when the temperature is at freezing or below.

There are two kinds of ice that may form on a plane and they are more deadly than a Zero or a Messerschmitt. One is clear ice, the kind that forms in the trays of your refrigerator. It is hard, glass-like, and difficult to break loose. The other is rime ice, the kind that forms on refrigerator coils. It is white, granular and can be flaked off. Non-turbulent clouds contain rime ice, or small ice crystals. Turbulent clouds contain clear ice made from droplets of water. Clear ice forms more quickly and sticks more tightly than rime ice. Usually a combination of the two are encountered in flight. (Turn to page 158)

Facts ABOUT



WEATHER OVER TOKIO

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You and Phenology

➤ IF YOU have ever taken note of the date on which the first robin appeared in your neighborhood, or the first pussy-willows or skunk-cabbages appeared, you have been a phenologist.

Phenology is one of the most fascinating of the open-air sciences. It consists essentially in the systematic observation of the dates on which things happen: the first robin, the first violet, the first oak

leaves, the first mosquito. It can go on all season: the first corn tassel, the first goldenrod, the first wild aster. As the year grows older, last things become worth noting: the last gentian, the last flight of wild ducks, the last housefly.

The word phenology comes from a Greek root meaning to disclose, to make visible or manifest. It is related to the common word, phenomenon, and to the post-Christmas feast of the Epiphany. (Incidentally, watch typists and printers who meet the word for the first time, lest they slip in a falsifying "r": phenology has no more to do with phrenology than entomology has to do with etymology.)

Phenology is a practically useful science as well as a fascinating hobby. Its pragmatic value is well demonstrated by its antiquity. Farmers' and woodsmen's lore is largely rough-and-ready phenology; Virgil's *Georgics* is an early textbook on the subject. The Bible is full of phenology, especially the New Testament parables: "Now learn a parable of the fig tree: When his branch is yet tender, and putteth forth leaves, ye know that summer is nigh."

Your own phenological notebook can be as full or as simple as suits your own convenience. The important thing is to

make it a year-to-year undertaking. Down one side list all the birds, flowers, trees and so on that you intend to watch, for first appearance, first nest, first eggs, first fledglings, first flowers, first leaves, first fruits, first signs of ripening, etc. Rule columns for each year, from 1945 until you are so old your eyes won't serve you any more, or your legs carry you afield.

An especially worth-while kind of phenological observations are those that are made on the same individual organism, if it is one that stays put. Trees are especially well suited to this kind of check-up, being both long-lived and firmly anchored. If you have a favorite elm or maple in your front yard, a pet apple or cherry tree on your lot, a familiar dogwood or hickory in the woods, it will become a better, more intimate neighbor than ever if you make a habit of asking it from time to time, "How are you feeling this spring? How did you come through the winter? Are all the little apples growing nicely?"

There can be a lot of fun in phenology.

Science News Letter, March 10, 1945

Tin and lead were definitely shown by the monk, Basil Valentine, to be distinct metals in 1450 A. D.

In the Genesis of the Rheumatic State

nutritional inadequacy of the diet appears to play an important role. Though multiple deficiency may be more conducive than deficiency of a single factor, insufficient protein intake apparently engenders increased susceptibility.* Thus an adequate amount of meat, with its high content of biologically optimal protein, gains added importance in the dietary of children.

*In a study of children and adolescents, undertaken to determine if nutrition exerts a conditioning influence in the genesis of rheumatic fever, Coburn and Moore conclude: "This indicates that the association between greater susceptibility and a deficient intake of protein is statistically significant . . . That a lack of those proteins most useful in growth and repair may be important in conditioning a subject to rheumatism is compatible with all observations made during this study." COBURN, A. F., and MOORE, L. V.: Nutrition as a Conditioning Factor in the Rheumatic State, *Am. J. Dis. Child.* 65:744 (May) 1943.



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PHYSICS

Shortage of Physicists

➤ A 12-YEAR shortage of the most essential scientists for war and industrial research as the consequence of the non-technical use of scientists and science students in the fighting forces is forecast by Dr. Gaylord P. Harnwell of the University of Pennsylvania, writing as editor of the *Review of Science Instruments* journal.

In this war with radar, airplanes, and other such devices, the nation's technical superiority is due to research in the field of physics, Dr. Harnwell points out, although chemistry played the chief role in the first World War. Figures show, however, that the number of physicists in training in this country has dwindled alarmingly.

The number of physicists who were granted the doctor's degree has dropped markedly in the war years, with only 55 in 1944 compared with a peak of 191 in 1941. Dr. Harnwell takes 26 as the average age at which a doctor's degree is received, 1941 as the last year in which a normal number of degrees were awarded,

and finds that even with a revival of training of 18-year-old students in 1945 there will be a gap of 12 years during which very few physicists will be available.

The nation will be short 1800 graduate physicists in 1953, compared with present 2833 Ph.D. physicists listed in the National Roster of Scientific and Specialized Personnel. The situation is made worse by the demand expected for physicists to conduct researches for industry in the postwar era.

Unlike colleges in the United States, British and Soviet technical schools have been allowed to keep up their enrollments as a war and postwar measure. An authoritative British report states that their output of engineers and physicists has more than doubled during the war.

Because many professors have been drawn away from the colleges for war research, the problem now and in the immediate future is not merely a matter of getting students into the colleges, but of reorganizing the teaching staffs to teach them

Science News Letter, March 10, 1945

From Page 156

Ice forms on the leading edges of the wing, propeller blades, on the radio antennae, on the windshield and on the air-speed indicator as well as in the carburetor of the engine. If ice forms at any of these points it will affect the flying performance of the plane, and in some cases render it unfit for flight. Today aircraft are equipped with mechanical devices such as rubber boot de-icers for the wings, de-icing fluid for propellers and windshield, and heaters for the air speed indicator. In the final analysis, however, the knowledge and judgment of the pilot are the greatest factors in determining whether he will beat the ice or crash.

The most dangerous of all icing conditions is caused by freezing rain. We are all familiar with ice storms on the eastern seaboard when tree branches break and power lines snap under the sheer weight of ice that adheres to them. A plane can ice-up just as heavily, and naturally it won't withstand the ice load. In a freezing rain the trick of outsmarting this dangerous adversary is to go up

higher, where warmer temperatures protect the plane from icing.

Military flyers taught to be weather experts know how to avoid these bad weather flying conditions and at the same time how to accomplish their missions in spite of them. Weather service bases are located in the far corners of the world, in the arctic and tropics where weather is born. Reports from these stations are transmitted to Washington D. C., where military weather maps are drawn and sent to our armed forces all over the world.

Weather servicing units accompany every military force, to provide on-the-spot short-range forecasts on which commanders base their tactical operations. Often these weather stations are mounted on vehicles. At Salerno a jeep fitted with weather observing equipment was one of the first units to land. Airplanes, fitted as weather laboratories, fly long distances to gather weather data before military or aerial operations are undertaken.

The uncanny ability that these weather men in our armed forces possess is illustrated by an attack on Wewak, New Guinea. Our planes were based at Port Moresby. Between the base and the target lies the towering Owen Stanley Range of mountains, usually crowned by 40,000 foot thunderstorms which blocked the way for our attack. The commanding general ordered the weathermen to predict a cloudless, stormless day. About 24 hours in advance of proper conditions, the weathermen issued a favorable forecast. Our attack, timed precisely to the forecast, enabled us to bag, at one time, 309 Jap planes without losing a single one of our own planes to our other enemy, bad weather.

Science News Letter, March 10, 1945

The stinging nettle, a weed, is a potential source of commercial *chlorophyll*.

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Books of the Week

► THE READING public now familiar with the word electronics but uncertain in regard to its real meaning can obtain enlightening information from AN INTRODUCTION TO ELECTRONICS, by Ralph G. Hudson, written for laymen with only an elementary knowledge of electricity, physics and mathematics. It explains what is included in electronics and the part this new science is playing in the research and industrial world. (Macmillan, \$3.)

Science News Letter, March 10, 1945

► APPRAISAL of the effects of war on higher education in this country is the purpose of THE ROLE OF HIGHER EDUCATION IN WAR AND AFTER by J. Hillis Miller and Dorothy V. N. Brooks (Harper, \$2.50). Wartime measures such as selective training, war-enforced withdrawals of faculty, accelerated war time curricula, state and government aid programs, etc., are discussed at length. Several chapters are devoted to the new education the boys will find when they come marching home. The influences that promise to predominate in the reconversion of American colleges and universities to peace-time conditions are summarized in the light of nation-wide trends.

Science News Letter, March 10, 1945

Just Off the Press

BACTERIOLOGY AND ALLIED SUBJECTS—Louis Gerstenfeld—Mack, 561 p., illus., \$6.

THE COMET OF 1577. ITS PLACE IN THE HISTORY OF ASTRONOMY—C. Doris Hellman—Columbia Univ. Press, 488 p., \$6.

THE COMMON COLD AND HOW TO FIGHT IT—Noah D. Fabricant—Ziff-Davis, 107 p., illus., \$1.50.

THE FIRE SERVICE TODAY—Frank Eyre and E. C. R. Hadfield—Oxford, 148 p., illus., \$2.

THE MARCH OF MEDICINE—The New York Academy of Medicine Lectures to the Laity, 1944—Columbia Univ. Press, 121 p., \$1.75.

THE QUEST FOR MORAL LAW—Louise Saxe

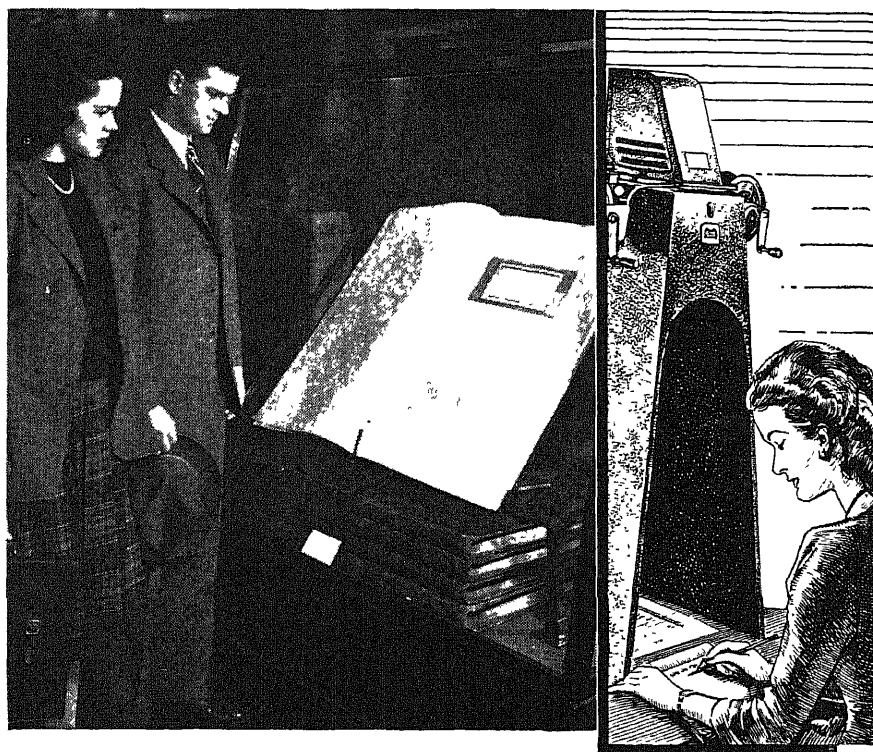
Eby—Columbia Univ. Press, 289 p., \$3.25.

TWO HUNDRED THOUSAND FLYERS, the Story of the Civilian-AAF Pilot Training Program—Willard Wiener—Infantry Journal, 196 p., illus., \$2.75.

Science News Letter, March 10, 1945

The stone-fly after hatching breathes first by gills that extend from behind the legs.

Salamanders require moisture and therefore live around wet moss or in damp earth; lizards are found most often in dry, sandy places or on tree branches where they can bask in the sun.



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Science News Letter, March 10, 1945

⚙️ **ASPHALTED BAGS**, placed between the outer case and the packaged food in K rations for soldiers in tropical areas assures complete protection in torrential rains and continued high humidity. This triplex asphalt-impregnated bag is in addition to the regular coverings for other climates.

Science News Letter, March 10, 1945

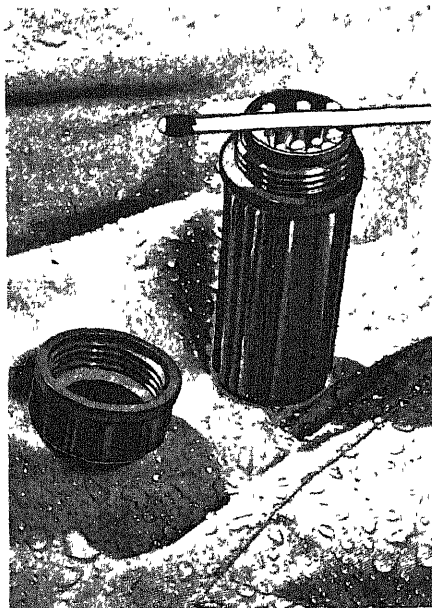
⚙️ **PICTURE SUPPORT**, illuminated, consists of a frame holding two pieces of transparent plastic sheets between which the picture is placed, and a flashlight bulb in a case behind. The bulb operates on the automobile battery, and the illuminated picture is attached to the steering wheel.

Science News Letter, March 10, 1945

⚙️ **NUT TURNING** device, replacing the familiar wrench, rotates the nut by a series of rapid hammer blows on its corners. Two projecting jaws embrace the nut, and the rotary hammer, having spaced projections or heads, turns it by repeated impact. Power is supplied to the hammer through a flexible shaft.

Science News Letter, March 10, 1945

⚙️ **WATERTIGHT** match cases for soldiers are made of an olive-drab molded



plastic with a screw top. It has a metal striker bar in the bottom. For safety matches, a striker is glued inside the top. The picture shows the pocket case with ribbed sides for easy holding.

Science News Letter, March 10, 1945

⚙️ **BRUSHLESS** shaving preparation in a dry stick, that may be applied to the wet face without any applicator but the stick itself, requires no massage by the fingers. It is largely sesame oil and spermaceti, mixed with small amounts of talow soap, fatty acid esters, titanium oxide and perfume.

Science News Letter, March 10, 1945

⚙️ **FOLDING bazookas**, one-half the length of the ordinary bazooka when folded, were developed for paratroopers but are handy for soldiers in underbrush and jungle. They were first used in the Normandy invasion.

Science News Letter, March 10, 1945

⚙️ **MEASURING** device is an elongated barrel that fits over the end of a pencil, with a graduated wheel two inches in circumference at its end. In measuring, the wheel, rolled over the distance, turns a screw inside the barrel that moves an indicator along a scale on the outside.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 249.

Science News Letter, March 10, 1945

BOOKS

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Question Box

AERONAUTICS

What are some of the applications in store for helicopters? p. 148.

What is the "Shooting Star"? p. 147.

BIOLOGY

What is phenology? p. 157.

BIOCHEMISTRY

What else has the mold *penicillium notatum* been found to yield? p. 152.

CHEMISTRY

What is the new anti-exposure suit for airmen made of? p. 152.

What new test has been developed to determine the quality of butter? p. 153

DENTISTRY

What may be the cause of tooth decay? p. 149.

ENGINEERING

How is it possible for the new diesel engine to change almost instantly from gas to oil? p. 151.

HORTICULTURE

What new lettuce variety is promised for 1946? p. 153

MEDICINE

How has it been shown that flu viruses grown on two widely different kinds of living tissue are chemically and physically identical? p. 147.

What diseases did our troops in the Pacific suffer from in the early days of the war? p. 149.

PHYSICS

How serious is the danger of a shortage of physicists in the United States? p. 158.

Where published sources are used they are cited.

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SCIENCE NEWS LETTER



THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 17, 1945

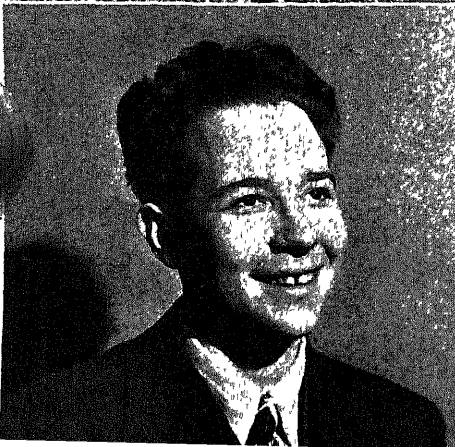
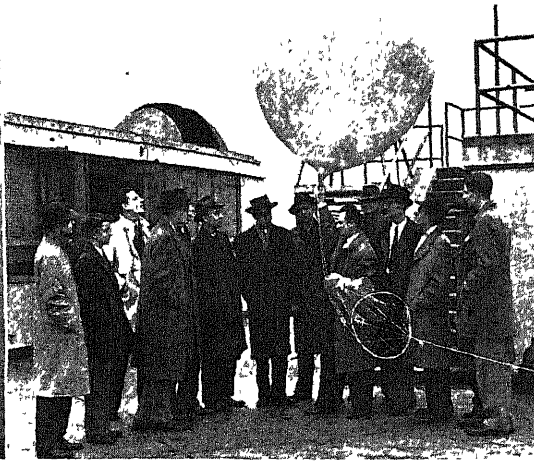


New Delhi

Scientists of Tomorrow

See Page 163

A SCIENCE SERVICE PUBLICATION



GENERAL SCIENCE

Science Scholarships

Boy who is a research chemist and a girl metallurgist, both from Brooklyn, win \$2,400 each as top students in the Science Talent Search.

See Front Cover

► A YOUNG 16-year-old organic research chemist of Brooklyn who has already worked with two classmates to prepare scarce organic compounds for the U. S. Army, won one of the two top-honor Westinghouse \$2,400 Grand Science Scholarships in the Fourth Annual Science Talent Search just completed by the Science Clubs of America. He is Edward Malcolm Kosower, a student in the senior class of Stuyvesant High School, New York City.

Top winner among the girls for the \$2,400 scholarship is Marion Cecile Joswick, 17, also of Brooklyn, who has picked research metallurgy as her field of scientific work. She has made a collection of fluorescent minerals and has set up and demonstrated apparatus for the microscopic study of diatoms, the algal fossils which form a kind of earth.

Portraits of the top winners are shown on the front cover of this SCIENCE NEWS LETTER.

Eight other high school seniors were selected by the board of judges to receive four-year Westinghouse Science Scholarships worth \$400 each, and 30 were granted one-year Westinghouse Science Scholarships of \$100 each. All 40 of these high school seniors attended a Science

Talent Institute in Washington at which they heard lectures by eminent scientists and had the opportunity of meeting scientific leaders.

Edward

In addition to the manufacture of scarce chemicals, Edward Kosower has been doing research in an attempt to synthesize pyridazine, one of a group of chemicals from which important medicines are derived. He has not yet succeeded in this, but with his associates, he did develop a new method for synthesizing a form of glutaric acid, which is an intermediate in the synthesis of pyridazine. Other research on the chlorination of fluorene with sulfuric chloride which he conducted with another finalist in the Science Talent Search has been published in the *Journal of the American Chemical Society*.

DENTISTRY

Caries May Be Prevented

► MAYBE some day in the future we will be able to keep our teeth from decaying by using toothpaste or chewing gum containing tryptophane or by swallowing regular doses of this chemical in the form of tasteless white crystals.

This possibility appears in a report by Mrs. Naomi C. Turner, of Radcliffe College, in the *Journal of School Health* (March).

"The essential amino acid tryptophane," she states, "has distinct promise as a preventive agent for dental caries."

Amino acids are protein building blocks. Certain of them are called essential because the body cannot synthesize them and must have them for growth and health.

Tryptophane's promise of preventing tooth decay is based on the finding that it slows down the rate of starch decomposition. In a previous study of 51 patients at the Forsyth Dental Infirmary Mrs. Turner and E. M. Crane had found a correlation between starch decomposition by the saliva and the amount of caries,

Marion

Metals and minerals have engrossed the attention of Marion Joswick since she was eight years old and was impressed with the beauty of a huge mass of translucent beryl at the Brooklyn Museum of Art.

Alternates for the \$2,400 Westinghouse Grand Science Scholarships are Nancy Jeannette Stafford, 17, of Watertown, N. Y., who is planning to be a psychiatrist when she can complete her training, and Robert Leonard Hall, 18, of Green Bay, Wis., who is interested in the study of ancient Indian life and other prehistoric man.

An ingenious method for restoring prehistoric pottery vessels that have been unearthed in fragments has been devised by Robert Hall, who has prepared a paper on Indian excavations that has been presented before the Wisconsin Academy of Sciences, Arts and Letters.

Nancy Stafford's essay was written about the use of the Indian arrow poison curare in the treatment of mental illness. She has, herself, done experimental work on animals to determine the effects of this potent drug.

Science News Letter, March 17, 1945

SCIENCE TALENT INSTITUTE
—Alternates for the \$2,400 scholarships are shown on the top row of the facing page: left, Robert Hall and right, Nancy Stafford. Center, a group of winners at the National Airport where, with the help of the Weather Bureau, they launched a balloon into the stratosphere. Second row left, Dr. Adams and a group of winners and right Maj. Gen. Osborn, Nancy Stafford, Edward Kosower, Marion Joswick and Robert Hall. The \$400 scholarship winners below are: Jerome Blackman, George Clark, Richard Milburn, Saul Kravetz, Michael Tinkham and Andrew Streitwieser. Photographs by Fremont Davis, Science Service Staff Photographer.

or tooth decay, in the mouth. Persons with 20 or more cavities produce saliva which decomposes, or hydrolyzes, starch very rapidly. Persons with little or no tooth decay produce saliva which hydrolyzes starch very slowly.

The finding that a high protein (low carbohydrate) diet has a favorable effect on caries and other findings led Mr. Crane to suggest looking to the amino acids for a material that delayed starch hydrolysis by the saliva.

Mrs. Turner has already tried the effects of doses of tryptophane in one person. Within a week, the time required for starch hydrolysis by this person's saliva had increased from a base rate of 20 minutes to 240 minutes. Whether tooth decay will be prevented, Mrs. Turner says, remains to be established.

Ordinarily, studies of a number of patients would be made before reporting results, but, Mrs. Turner states, she is reporting consistent studies of one individual at this time in order that interested research workers may undertake

simultaneous studies on the effects of tryptophane in reducing tooth decay.

Best dosage and best way of giving the

chemical will also have to be determined in future studies.

Science News Letter, March 17, 1945

GENERAL SCIENCE

Future of Science

The development of the study of man depends upon the younger generation whose minds are the least touched by the psychoses of the war.

By MAJ. GEN. F. H. OSBORN

Director, Information and Education Division, Army Service Forces

Address given before the Awards Dinner of the Fourth Annual Science Talent Institute, March 6, 1945.

► WE ARE meeting here tonight during one of the critical periods of the life of man on earth. For the first time in human history the cultures of the races and nations of men are merging into one great human culture. This process began some hundreds of years ago with the voyages of Marco Polo. Then India became accessible, North and South America were discovered and colonized, and finally in the lifetime of living men Japan was broken open, the islands and peoples of the Pacific became known, North Africa was explored and Old China began to turn in her century old sleep. The land of the world could be put down on maps and charts. The people of the world could be studied and described by anthropologists. But in vast areas the people retained their old cultures, unaware of other ways of living of the men in other lands.

Now the most terrible of all wars has hastened this change to one world. Using all the technical advances of our scientific age, the war has linked the nations of the globe with air routes, with radio, with the rapidly distributed printed word; men travel by plane today from any spot in the world to any other spot in 60 hours. By the end of this year it may be 40 hours. The voice of Stalin or Roosevelt or Churchill or Hitler is heard instantaneously in any corner of the globe where man has a good enough receiving set. *Yank*, the Army weekly, the first global publication, is printed simultaneously in 20 different spots clear round the world. Never again will any people on this earth be out of touch with what is going on concerning the people in the rest of the world. Not unless we fail.

Unless we fail? Who, we, Americans, we, of the United States, of my generation and of your generation? Are we so important in these critical times? Yes, by a strange turn of fortune, and not at all by our own desires, that is just how important we are. The people of the world are at one of the great cross roads of history. One road leads to a new dark age. The other road leads to a new and better world. And because for the first time we are living in one world, it is no longer possible for different nations to take different roads. Whichever road is chosen, all the people of the world will have to follow it. The choice of roads is hanging in the balance. Many people will wait on the decision of the United States, in many respects the most powerful nation in the world. Our weight, thrown in the balance, will be a mighty factor in deciding which road mankind will follow for a long time to come.

So, now, let us look into the minds and hearts and experience of we the people of the United States, in order to see how qualified we are to make such a choice.

We have some bad handicaps. We must be very frank with ourselves about that. We have lived our whole life as a nation in a very self-contained continent whose vast natural riches have provided materials for the good life without trading with other lands. So we are less conscious than other people of our ultimate dependence, on the rest of the world. Because we haven't had to live on world trade, we don't know the rest of the world as the British and many countries of Europe do. Until just recently we have been isolated or protected by two great oceans, so we haven't had the experience of having to live with our neighbors. Many people actually came to this country in order to get away from oppression in other countries, so many in fact that

it became one of our national principles that we could and should live apart from other peoples. But that was before radio and airplanes and robot bombs and rockets.

Finally, and worst perhaps of all, life has been very easy for us compared to the life other peoples have had to live. We've had more land, more food, more roads, more cars, more telephones, more bathtubs, more central heating, more margin of wealth to devote to science, education, music and art, than any other people, though other people worked as hard or harder than we did. Let's be very honest with ourselves,

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ALTERNATES

Stafford, Nancy Jeannette, Watertown, N. Y.
Hall, Robert Leonard, Green Bay, Wis.

SCHOLARSHIPS OF \$400

Stafford, Nancy Jeannette, Watertown, N. Y.
Hall, Robert Leonard, Green Bay, Wis.
Blackman, Jerome, Far Rockaway, N. Y.
Clark, George Whipple, Harvey, Ill.
Kravetz, Saul, Brooklyn, N. Y.
Milburn, Richard Henry, Newark, N. J.
Streitwieser, Andrew, New York, N. Y.
Tinkham, Michael, Ripon, Wis.

ALTERNATES

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Sessler, Andrew M., Forest Hills, N. Y.
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Wingert, Ann, Madison, Wis.
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Walker, Edward John, Detroit, Mich.
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Judges: Dr. Harlow Shapley; Dr. Stuart Henderson Britt; Dr. Harold A. Edgerton

these things have made us a little conceited. We think we're smarter than other people, and we don't admit how much the difference in our living is due to the vast riches of this self-contained continent we're living on and the heritage of freedom and character with which the original settlers were endowed by the culture of western Europe, rather than by any innate superiority of their own. Besides making us a little conceited and critical of other people not so well off, perhaps this comparative wealth and ease of life has

made us a little soft? I don't know about that. We can fight a war all right. But can we make sacrifices for a more distant objective such as the unity of the world? Can we refrain from criticizing others 'till we know the facts? Can we order our economic life so as to help and not hinder the economic life of other people in the world? Can we live with our minority groups successfully and yet not let any one of them swerve us from our purposes as a nation? Only time can answer these questions, which are indeed questions of our ability to choose the right road.

Against all these handicaps which have hitherto held us back from taking a full part in the world, we have some very great qualifications which may at long last move us to take a position of wise leadership.

We have the great moral heritage of the Christian religion, which has permeated our lives 'till we are almost unconscious of the sources of our strength,

which lie in respect for the individual and belief in the value of each human being, in honesty, fair play, giving the other fellow a chance, in service to others.

We have the great political heritage of the best of western Europe reaffirmed by Lincoln and by this very war, that government of the people, by the people, and for the people shall not perish from this earth.

We have the hope, confirmed by our own experience 'till it is almost a national belief, that we can by our own efforts and brains make the world a better place to live in. No other people hold this belief, this national aspiration, quite so firmly or quite in the same way as we do.

All in all, these things lead me to think that we will make the right choice at this crossroads in the long history of man on earth. Hesitatingly, slowly at first, I believe we will move and when it is clear which way we are going,



VISIT TO CAPITOL—The group of winners met Vice President Harry S. Truman at his office. Left to right standing are: Andrew Sessler, Ruth Reichart, Kirby Dwight, Jr., Lois Boochever, Saul Kravetz, George Clark, Maynard Michel, John Anson, Jerome Blackman, Charles Reed, Nancy Stafford, Andrew Streitwieser, Michael Tinkham, Vice President Truman, John Wahlgren, Edward Kosower, Marion Joswick, Robert Handschumacher, Edythe Parker, Edward Walker, Renate Kaufmann, Jean Gurney, Madeline Levy, Robert Diebel, Halsey Royden, Ann Wingert, Margaret Hodgson, Alice Dale, and James Kauer. Kneeling are: Robert Sinclair, Russell Ellis, Robert Hall, Matthew Kegelman, Frederic Petersen, John Moore, Richard Milburn, Ronald Rich, Harold Conroy, David Hill and Walter Spink.

all those others whose hopes triumph over their fears, who believe in the destiny of man, will find themselves on the same road with us.

This choice will be made by our hearts, or at least by those subconscious inner forces which determine the actions of men and of nations in their greatest moments.

But if our hearts make the right choice, then our brains will have such an opportunity for leadership as the world has never known before. What I am trying to express is best illustrated by this very meeting to honor the junior scientists brought together here.

I venture that no such meeting is going on, or could go on, on such a scale at this time in any other country of the world. I feel sure that no other country in the world after what it has been through in the past six years, could produce forty human minds as unprejudiced, as unconfused, as trained in the clear thinking of the physical sciences, as are the minds of the forty young men and women here tonight, representative of many thousands of other such young and clear thinking minds almost unique to the fortunate background of our country in this period of destruction. Here lies the greatest hope that we can offer, if we move on the road of leadership.

To a very great extent it is the advance of the physical sciences which has made modern civilization possible. Through these sciences man is in a very real sense affecting the conquest of his environment. But it has been at a heavy cost. The very instruments man has devised to increase his physical comfort and security he has turned against himself in terrible destructive wars. The advance of man as a social animal has not kept pace with his advance in knowledge. If we are to use to man's advantage the products of your skills, we must learn better how to rule ourselves and how to live together. For this we must turn to the field of the social sciences.

In the past 30 years, in this country—and in no other country in the world—the social sciences have begun to emerge from arm chair philosophies to at least the rudiments of true sciences, the truth of whose findings can be demonstrated by experiment or by statistical treatment of things that can be measured. Thus for the first time we really know some things about human heredity and individual differences; we really know some things about human psychology,

and social behavior under different environments.

We have for the first time some very specific knowledge about the increase of human populations.

We have tools by which we are beginning to be able to measure the effects of social and psychological influences. In other words we are beginning to break open the most difficult, complex, and fascinating science of them all, the science of man.

Your brains of the coming generation trained in the hard close logic of modern scientific techniques; your minds of all the world least touched by the psychoses of the war; your hearts inheriting, if pray God we have properly passed on that heritage, the best in the ethical and religious experience of the race; these brains and minds and hearts may do this job. Here in this our country is the reservoir of such resources; and so I believe we can, if we will, enter into our period of leadership with good hopes that we may acquit ourselves well.

I do not think that we need to spur the coming generation to their task. The immense difficulties which have 'till recently barred access to the sciences of man now offer such a challenge that the ablest and most courageous minds can no longer resist; and only such minds should enter this field. How freely they can work there will depend on the older people of my generation. It is we who need a little heart searching advice.

For we of my generation must recognize that there has seldom been a cleaner break between two generations of scientists than the break between the younger men in the social sciences and the older men in the same field. The younger men are trained in the use of new statistical methods, they have a healthy skepticism of any finding that can't be proved up. The older men, lacking the new techniques, were trained to base their findings on their personal observations. Inevitably, they tend to differ more among themselves. Indeed the use of the word science can hardly be applied to the study of man and his social reactions under these older methods. The true science of man must be developed by the younger men trained in the use of the new tools.

Yet it is the older men who make the decisions as to who shall work and in what field. They still control most of the funds, most of the appointments. They direct the faculties and the courses

"In addition to its use in the synthesis of polycyclic aromatics, the modified Willgerodt reaction should find application in the synthesis of certain aryl-substituted aliphatic compounds. For instance, 10-Phenyl-1-Decene could be prepared from n-Octyl Phenyl Ketone via the Willgerodt, reduction to aldehyde, condensation with malonic acid, and decarboxylation.

"Because of the comparatively smooth course of the modification, I shall attempt many studies which otherwise might have failed for lack of equipment and working material. In the future, I shall try to make a comprehensive study of the method including these possible phases: mechanism of the reaction, a factor which could probably be best determined by using branched-chain aliphatic phenyl ketones and studying the acids obtained from these; use of unsaturated ketones such as those which can be derived from vinyl, allyl, crotyl, and so on; effect of the reaction on such compounds as dibenzoyl ethanes, dibenzoyl propanes, etc.; the use of selenium and tellurium, the analogues of sulfur, in the reaction, and last, but not least, the effect of organo-metallic reagents on the intermediate thiomorpholide complexes.

"It is interesting to note how the field of organic chemistry develops under scrutiny: from an extremely obscure topic, which, as yet, has occupied a total of one page in the Journal of the American Chemical Society, it expands so that a complete study such as I have outlined above would take years to complete. And, as far as possible, I will complete it."—From the essay of Edward Malcolm Kosower.

of instruction. If the older men are wise they will play the role of philosophers rather than technicians. In return for what they give up, they can share in the planning of this greatest adventure of science. They can direct the energies of the able and well-trained younger men to those fields of science in which America can best serve mankind. They can use our great ethical heritage to give the work of these younger men purpose and direction. Then, and then only, can we have faith that the weapons forged by the physical sciences can be turned to the common good, as they have in this war, destructive forces suddenly let loose on an untutored world.

"Today, in our complex civilization, we could not exist without metals. Metals have pictured the progress of civilization. Certain stages in man's advancement are designated by such names as 'Gold Age,' 'Bronze Age,' 'Copper Age,' and 'Iron Age.' Metals are the basis of modern industry and we would be lost without them. I, for one, should like to become a part of this living, breathing creature called 'industry.' For me, the greatest glory would be in playing a leading role in the life of the metals. It would be of the greatest honor, and I should feel that a privilege had been bestowed upon me if I could actively participate in developing this exciting field.

"I now know that I should like to become a research metallurgist. I wish to know more about these fascinating metals—from the moment they are torn from the dark caverns of the earth and separated from their ores, until they emerge as the thousand and one different articles without which life today would be much less comfortable.

"It is my firm intention to enter a school of high standing where I may earn a degree in metallurgical engineering, then when I have acquired this background and training, I will go forth into the industrial world and attempt to become a helpful, useful cog in the machine which is carrying on the work of the world."—From the essay of Marion Cecile Joswick.

NUTRITION

Study of Hungers Affords Scientific Opportunity

By DR. WARREN B. MACK

President, American Society for Horticultural Science; Head, Department of Horticulture, Pennsylvania State College

Address given before the Science Talent Institute.

➤ **HUNGRY** plants and hungry people open many fields of study for the young scientist. Thus far, scientists have only begun to find the nature and extent of the hungers that exist. Much more knowledge is needed on these aspects of hunger before an understanding can be attained of the ways in which the existing hungers may be satisfied.

Examples of studies on hungry plants and hungry people are the two researches now in progress at Pennsylvania State College. One of these, known as the Pennsylvania Mass Studies in Human

PHYSIOLOGY

Inheriting Atoms

➤ **EVIDENCE** of great economy in the animal body's use of mineral elements is offered in a study by Prof. G. Hevesy of the University of Copenhagen, on "tagged" atoms of artificially radioactive phosphorus in laboratory mice. The research is reported in a testimonial volume celebrating the sixtieth birthday of the noted physicist, Prof. Thé Svedberg of the University of Uppsala, recently published in Sweden, copies of which have just been received in this country.

Prof. Hevesy injected into the bodies of pregnant female mice a solution of a phosphate which had been rendered artificially radioactive, so that the atoms could be detected by suitable apparatus wherever they turned up. After the young

mice were born, one was immediately killed and its body tissues analyzed to find how much of the maternal dowry of "tagged" phosphorus had been passed on to it. After three months, when the new mice were full-grown, another was killed and similarly analyzed. It was found that 40% of the phosphorus concentration present in the newborn mouse still remained in the body of its littermate three months later.

In another series of experiments, the radioactively "tagged" phosphorus atoms were traced through three generations. The concentration in the granddaughter mice was found to be six-tenths of one per cent of what it had been in their mothers at birth.

Science News Letter, March 17, 1945

Nutrition, has been in progress during ten years under the direction of Dr. Pauline Beery Mack, Director of the Ellen H. Richards Institute. In this study, a staff of medical and dental scientists, chemists, physicists and geologists has examined individuals and families selected to represent the population of certain cities, towns and rural areas in Pennsylvania in the same proportions as the various racial, age, economic, and social groups that occur in the respective population. Records are kept of the foods eaten by the persons examined, and these are compared with the nutritional status or condition of these persons or families. Measurements of nutritional status include medical and dental examination, physical measurements to show body build, development, posture and conformation, chemical analyses of body fluids to find their content of vitamins, minerals and proteins; microscopic examination of the skin and tissues of the eyes, mouth and tongue, X-rays of bone to reveal structure and mineral content, and measurements of certain functions known to be related to the nutrition. The studies include also observation on the improvement in various respects brought about by certain foods and dietary supplements added to the diet of certain groups on an experimental basis.

The study of plant nutrition engaged in by Dr. Mack is one which has been carried on by Dr. Walter Thomas, plant physiologist of the laboratory of plant nutrition of the Department of Horticulture at Pennsylvania State College dur-

ing more than 35 years, the last 10 with the cooperation of Dr. Mack. In these studies, the mineral nutrition of crop plants grown by commercial methods had been analyzed by determining the concentration and proportion of chemical nutrients in selected leaves, the plant organs in which important syntheses occur. These concentrations and proportions are determined from time to time during the growth of the plant, and are related to the development and yield of the plants, as well as to the different fertilizers, cultural practices, and climatic conditions to which the plants were subjected.

Both of the research studies described have shown that plants as well as humans are suffering from many varieties of hunger. They indicate that, to satisfy these hungers, not only must new foods and nutrients be adequate and of the right kind, but also they must be in the proper proportion. They show also that hungry plants result in hungry animals and hungry people, because they do not supply the qualities needed to satisfy the hungers of the final consumer. Vast areas of soil in this country either lack the nutrients or supply the improper proportions to nourish fully plants, animals and people living on them. Studies similar to these pioneer researches at Pennsylvania State College are yet to be made in most of the country, but are needed if our increasing population is to be well fed; they offer abundant opportunity for great numbers of talented young scientists.

Science News Letter, March 17, 1945

BOTANY

Embryo Corn Plants Grown in Lab Vials

► EMBRYO corn plants, tucked tightly away in recently formed grains, are carved out and grown in sterile laboratory vials, by a technique developed at the California Institute of Technology. Prof. A. J. Haagen-Smit, with R. Siu and Miss Gertrude Wilson, report details of the new method in *Science*, (Mar. 2).

The grains are cut under aseptic conditions with a very sharp, narrow razor blade, and the little plants are lifted out with spear-shaped dissecting needles. They are fed on a solution containing sugar and other materials necessary for growth.

In earlier work done elsewhere, embryo jimsonweed plants had to be given a little coconut milk in addition to the regular nutrient solution. It was found, however, that the corn embryos would grow without this particular kind of infant food.

Laboratory cultivation of plant "incubator babies" is sometimes necessary when plant hybrids are being produced, because in some cases these hybrids, though desirable for scientific purposes, are unable to grow if the seed is planted in the ordinary manner.

Science News Letter, March 17, 1945

MEDICINE

Penicillin for Civilians On Sale at Drug Stores

► PENICILLIN for civilians is now on sale at drug stores. On March 15, the War Production Board lifted restrictions on the life-saving mold chemical and made it available through normal trade channels to all hospitals and physicians.

You will be able to see and perhaps to buy the chemical but it will be put up in form for hypodermic injection for your doctor to give you. There is not yet enough of the material for use in manufactured products such as pills, ointments, lozenges and other forms which the layman might use himself. If and when it becomes available in such form, the Food and Drug Administration will decide whether it may be sold without a doctor's prescription.

Between March 15 and March 31, 1,280,000 vials, each containing 100,000 units of penicillin, will be released, WPB states. In April and each month thereafter, an additional 1,500,000 vials, approximately, will become available. The

2,700 civilian hospitals that have been getting penicillin through special arrangement with WPB have been using about 400,000 vials a month.

Supplies exported via the Foreign Economic Administration will not be affected by release of the drug for general civilian use in this country. WPB plans within the next two months to increase the allotment for export also.

The fact that penicillin can now be made available for civilian use generally is due, WPB states, to the cooperation and stupendous production job of the penicillin industry and its employees.

Science News Letter, March 17, 1945

MEDICINE

War-Wounded Men Aided by New Devices

► TWO DEVICES to help the healing of war-wounded men are among recently patented inventions. One, protected by patent 2,362,466, is an adaptation of the familiar baby-walker to the needs of grown men who need to re-learn the use of their legs. A wheeled framework, hinged and swiveled for greater flexibility, supports a pair of crutch-like members on which the patient may lean as he makes his way about. This device is the invention of Frank E. Carter of Minneapolis.

The second surgical invention, covered by patent 2,362,741, is by Joseph D. Berke of New York City. It is an extension of the now-familiar pin-splint principle to take care of fractures of the jaw. A curved bar goes around the outside of the jaw, with openings for the insertion of bone-securing pins where they are needed.

Science News Letter, March 17, 1945

CHEMISTRY

High Volatile Substances For Food Preservation

► SOMETHING new in chemical food preservation methods is offered by Francis K. Baerwald of Berkeley, Calif., for patent 2,370,768. Instead of using a germ-killing preservative that stays permanently in the food, perhaps injuring its quality, he uses a high volatile substance, such as ethylene oxide or methyl bromide. The food is packed in bags of Celophane or Pliofilm, which are permeable to the vapors of these substances, so that after they have killed the molds and fungi present they soon vanish without a trace. The well-sealed film covering, however, prevents any further entry by spoilage organisms.

Science News Letter, March 17, 1945

MEDICINE

Warning Comes to Use Sulfa Drugs With Caution

► THERE seems to be growing up a potentially dangerous custom of passing sulfa drugs around the family or even the neighborhood. It starts in a typical case when Junior has a bad sore throat or bad earache. The doctor is called, examines Junior and prescribes a sulfa drug. Junior gets well fast. So fast that mother and all the relatives and neighbors are impressed and mother puts the bottle or box with the remaining sulfa drug carefully away in the family medicine chest. Sometime later she or another member of the family has a bad cold and aching throat. Remembering Junior's speedy recovery after he was given the sulfa drug, she gets out the bottle and proceeds to dose herself or whoever is sick.

This custom is dangerous for a number of reasons. Sulfa drugs are powerful but not completely harmless medicines. That is why most of the 48 states have laws or regulations forbidding their sale except on a doctor's prescription. Some persons have gotten very sick from sulfa drugs. They may have been sensitive to them, in the same way as some people are sensitive or allergic to strawberries or seafood and get sick from taking them. The sulfa drugs may do more than make the sensitive person feel sick. They may cause marked changes in the blood and damage the kidneys.

Another danger in indiscriminate use of sulfa drugs comes from the fact that marvelous as they are, sulfa drugs are not cure-alls. When the doctor prescribed the sulfa drug for Junior he knew that Junior's sickness came from germs susceptible to sulfa drugs. If he was not sure from the symptoms, he took a swab from Junior's throat or a sample of blood and sent it to a laboratory for testing. Junior's mother could not know that her sore throat was caused by the same germs, she could only guess. And she could only guess at how much of the drug to take. The dose for Junior might not be right for her. She ran the risk of taking too much or too little or of wasting precious time taking sulfa drugs when she needed something else.

Science News Letter, March 17, 1945

CHEMISTRY

Ammonium Nitrate Used In Powerful Explosive

► A POWERFUL explosive, useful for blasting and demolition purposes, is made out of a substance that hardly rates as an explosive at all, simply by dusting it with a finely powdered mild explosive and setting it off with a small booster charge of TNT. The basic substance is ammonium nitrate, widely used as a fertilizer and in chemical manufactures; the dusting is done with nitro-starch, to the extent of from 0.5% to 3% by weight. A little adhesive of some kind (even corn syrup can be used) helps the two to stick together.

The new, low-cost, easily-made explosive is described in U. S. patent 2,371,000, recently issued to Dr. Walter O. Snelling, research chemist of the Trojan Powder Company, to which concern rights in the patent are assigned.

Secret of success in getting the usually inert ammonium nitrate to rip itself apart with destructive violence seems to be in the even distribution of the provoking explosive, and the chemical pace-setting by the booster charge of TNT. The very fast detonation wave started by the TNT, helped along by the nitro-starch, travels at its initial rate through the entire charge.

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ASTRONOMY

Infrared Auroral Display Detected in Night Sky

► AN INFRARED auroral display has been detected in the night sky. This radiation of waves, invisible to the human eye and far more intense than the ordinary persistent aurora, is probably due to a large number of nitrogen atoms in the high atmosphere, state Prof. Joel Stebbins, Prof. A. E. Whitford and Dr. P. Swings of the Mount Wilson Observatory of the Carnegie Institution of Washington and Washburn Observatory of the University of Wisconsin.

This strong infrared radiation was first detected in 1940 on a photograph of the great Andromeda nebula made with an infrared filter, they report in the *Astrophysical Journal* (Jan.). In 1944 the infrared sky was found unexpectedly to be

of nearly twice its ordinary brightness and to be fluctuating by 10% to 15% within 10 minutes.

"The infrared radiation is obviously much brighter than any other part of the spectrum, including the persistent auroral line at 5577 Angstroms, for which we have never found any effect," the astronomers state. "With allowances for the continuous sky spectrum, the infrared radiation is probably scores of times—perhaps even a hundred times—as strong as the line in the green."

The main source of the radiation is probably near 10,000 Angstroms, where it would be between two strong water-vapor absorption bands.

The infrared radiation is believed to be atmospheric because it varies with the distance from the zenith, decreases through the night, and varies irregularly from night to night and from season to season. It is brightest immediately after twilight.

In order to estimate the height above the earth's surface at which the rays are emitted, it is suggested that measurements be made at widely different zenith distances every minute or less, and that they be carried to near the horizon. The radiation should also be studied soon after sunset and before sunrise to find the effect of solar radiation.

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ORDNANCE

New Mount Can Deliver High-Angle Cannon Fire

► TANK gunners will in future be better able to "shoot upstairs" at such targets as the upper floors of fortified buildings and pillboxes on steep hillsides, thanks to a new gun mount devised by an officer of the Ordnance Division, U. S. Army, Col. Joseph M. Colby of Grosse Pointe, Mich. The mount permits the tank's heavy gun to be elevated to any angle up to 60 degrees, and depressed to 10 degrees below horizontal.

The gun is mounted within a hood of strong armor, which also completely protects the forward end of the recoil mechanism, left vulnerable in many present-type mounts. This hood, in turn, is set in a vertical circular shield, which gives close cover to the gun-port through all degrees of elevation. Traverse of full 360 degrees is provided by the usual turret arrangement.

As is customary with all Service-originated inventions, rights in the patent, No. 2,370,148, are assigned royalty-free to the government.

Science News Letter, March 17, 1945

MEDICINE

Penicillin Successful For Syphilis in Babies

► PENICILLIN may restore to health babies born with syphilis, it appears from studies in four university medical schools reported in the *Journal of the American Medical Association* (March 10). The report is signed by Drs. R. V. Platou and Allen J. Hill of Tulane, Norman R. Ingraham of Pennsylvania, Mary S. Goodwin of Johns Hopkins, and Erle E. Wilkinson and Arild E. Hansen, of Texas.

A total of 69 babies have been treated by the group. Of these, 39 have been followed for from four to 12 months. Twenty-five of these are now "physically normal" and blood tests are negative in 21, doubtful in four. Another nine of the babies are "also well" although their blood tests are still positive.

Clinical relapse in two and serologic relapse in five babies occurred. Five of the 69 babies died, three of them soon after or during treatment. These three had active syphilitic sores, were under two months of age and in poor general condition. Whether the two deaths five and 14 weeks respectively after treatment were due directly or indirectly to penicillin or syphilis is not known.

Best dosage schedules for penicillin treatment of congenital syphilis in infants, the doctors report, has yet to be worked out.

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CHEMISTRY

Polymerized Silicones Produce New Substances

► SILICONES, the new family of organic compounds of silica that have already created a considerable stir in chemical society, are joined by a group of new members described in patent 2,371,050, obtained by Dr. James F. Hyde, of the laboratories of the Corning Glass Works.

Dr. Hyde polymerizes silicones, with the addition of other chemical elements, to make new resin-like substances of remarkable physical properties, ranging from tough and rubbery to hard and brittle, with high resistance to both heat and electricity. As an example, phenyl ethyl silicon, used as an impregnating agent in glass-fiber cloth, produces an insulating material of double the electrical resistance of standard varnished cloths now on the market.

Science News Letter, March 17, 1945

MEDICINE

Malarial Volunteers

More than 200 volunteers in federal and state prisons are taking part in tests of new drugs; follows historic yellow fever studies.

➤ FOLLOWING in the footsteps of the American soldiers who nearly 50 years ago voluntarily risked yellow fever death to help conquer that deadly plague, more than 200 volunteers in federal and state prisons have been playing the roles of human guinea pigs for final testing of new antimalarial drugs.

Announcement of this phase of our war on malaria comes from the committee on information of the division of medical sciences of the National Research Council.

The tests as well as preliminary studies leading to development of new antimalarials and their testing on birds and monkeys have been under the supervision of the board for the coordination

of malarial studies, a joint body composed of representatives of the Army, Navy, Public Health Service, Office of Scientific Research and Development and National Research Council.

Results of the tests, started last March, are not given in the detailed announcement of how they are carried out. The three institutions from which prisoners have volunteered are the U. S. Penitentiary at Atlanta, Ga., the Illinois State Penitentiary at Joliet, and the New Jersey Reformatory at Rahway.

Some of the prisoners will undoubtedly get malaria, since a certain number must be left untreated to make sure the mosquitoes that bite them and the other volunteers actually are carriers of the disease. The others may or may not get malaria depending on the efficacy of the new remedies being tested. Those getting the remedies, especially those used to test

for best dosages, run the risk of getting sick from the drugs if they turn out to be more toxic than expected.

The testing program grew out of the military importance of malaria in the present war and the need for more effective weapons against this disease than those now available.

"Quinine and atabrine," the announcement explains, "are very efficacious drugs in suppressing the clinical attacks of vivax (benign tertian) malaria, but neither is capable of eradicating the disease completely once a person has become infected. The large number of men returned to the United States with recurring attacks of this type of malaria attest to the incomplete worth of available drugs against this disease."

"In the field of mosquito-killing agents the recently discovered compound DDT has been phenomenally effective, but no insecticide has yet been found which can kill all mosquitoes under all situations. Engineering control methods, although effective in local areas, are too costly to be the complete answer to malaria in the tropics."

"The highest hope, therefore, is for a specific drug that will actually cure or prevent malaria."

Science News Letter, March 17, 1945



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CHEMISTRY

Helium Storage Reservoir

➤ A GIGANTIC underground helium storage reservoir will soon be in use in the 50,000-acre government-owned Cliffside natural gas field near Amarillo, Texas, to hold for future use surplus helium gas not now needed by military and other government agencies, or by American industries. A new pipeline, 32 miles in length, now connects the government helium plants at Exell, and Amarillo, Texas, and extends to the oil-field reservoir. The surplus gas will flow through these pipelines to the natural underground storage place.

The helium piped back into the ground must be repurified later when it is withdrawn for use, but the gas taken from the cache will be richer in helium content.

Since 1923 the Cliffside field has produced enormous quantities of natural gas from which millions of cubic feet of helium gas were separated by the U. S. Bureau of Mines, and up until the present war was the principal source. The Bureau now operates five plants, and is

producing 25 times as much helium as in prewar days. This accounts for the surplus. The government is the only producer of this valuable gas.

Helium has a wide variety of military uses and is also used widely in scientific and industrial operations, a use that undoubtedly will greatly expand after the war. It is used principally in balloons and airships to replace hydrogen because it does not burn. It is so inactive chemically that it has no compounds. Flaming bullets or atmospheric electricity have ignited hydrogen in balloons and dirigibles, but never helium. A mixture of 80% helium and 20% hydrogen is non-inflammable. Helium has twice the density of hydrogen, but its lifting power as used in airships is over 90% as great.

An important use of helium in industrial operations is in welding, to protect the parts being welded from oxidation or other chemical reaction. It has lately been used experimentally in the treatment of asthma.

Science News Letter, March 17, 1945



HOBBY NIGHT—Marion Joswick's exhibit shows the phenomenon of fluorescence, Nancy Stafford displays a study of curare, and Edward Kosower has developed a new procedure for synthesizing a form of glutaric acid. Second row, George Clark's display shows the extraction of rare earths from Brazilian monazite sand, Robert Handschmacher's specialty is the fractional distillation of petroleum, Russell Ellis built a spectroscope. Third row, John Anson demonstrates his audio amplifier, Robert Sinclair explains the theory of projectiles, and John Wahlgren has a demonstration of atomic structures. Fourth row, John Moore exhibits one of the applications of the polynomial theorem, Maynard Michel shows his electric arc furnace, Richard Milburn talks on a beam of light, and Robert Hall displays his method of restoring Indian relics.

Do You Know?

Alcohol and aluminum may be on the crucial list throughout 1945.

Agar is also known as Japanese, Chinese, Bengal or Ceylon isinglass.

Pyrethrum for insecticides, grown principally in Japan in prewar days, is now being experimentally raised in Ceylon with promising results.

Penicillin is being produced on a commercial scale by 21 plants in the United States and Canada, as well as by many others in foreign countries.

Naphthalene flakes placed under the drainage hole of a flower pot will release vapor that will rise inside the pot and kill tiny worms.

Tomatoes were the outstanding favorite vegetables grown by Victory gardeners during the past war years; onions and cabbage were high in favor.

Glass-lined containers in the chemical industry have grown greatly in favor and use because they withstand the corrosive action of all acids except hydrofluoric, and of many other chemicals.

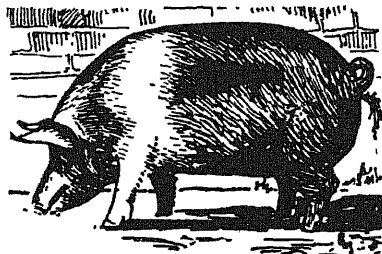
Brewer's yeast, a by-product of beer-making once largely wasted, is a first-class protein food for poultry and farm animals, as it is rich in all the important vitamins of the B-group.

Waxy corn, to replace supplies of tapioca obtained from the East Indies before Pearl Harbor, was grown last year on nearly 16,000 acres in Iowa alone, yielding an average of 55 bushels an acre.

Over 10,000 tons of *animal bones* were imported annually in prewar years from France, Africa, South America and India by Swiss factories that produced industrial fats, glue and fertilizers.

Infra-red rays are used to photograph valuable old paintings to aid research into the techniques of the old masters; they penetrate through the upper layers of paint and reveal the subsurface modeling.

Bituminous *coal output* per miner per day in America averages over five tons, while in England it is only slightly over one ton; the wide use of mining and loading machinery in this country is partly responsible.



Pigs and Potatoes

► IRELAND owes much to the pig, more to the potato. A small country of small farms, having moreover to endure the drain of foreign exploitation through much of its history, Ireland simply had to be able to offer its people cheap, easily produced food if they were to survive, let alone increase to the emigration point as they have notably done. Pigs and potatoes, both prolific even in limited space, are par excellence the poor man's meat and bread. It is not through mere whim that the image on the Saorstat's halfpenny piece is not the face of a sovereign or a national hero but the figure of a fat sow and her squealing brood: Ireland owes much more to her pigs than to her politicians, any day.

Yet the pig is not native Irish. Apparently all the domestic pigs in the world came originally from somewhere in Asia, perhaps China. However, Ireland had pigs before she even had a history—and Irish history is long. And if anything were needed to naturalize the pig, making him Irish forever, it would be the fact that St. Patrick himself served as a swineherd, when as a youth he was kidnaped into serfdom under a pagan master.

The potato, being a gift of the New World, came to Ireland much later, and well within the frame of written history. Coming from high-altitude country in the southern hemisphere, this root crop adapted itself readily enough to the cool, moist climate of Ireland's northern high latitude, where corn, the other great bulk-feed plant from America, would not thrive.

Legend says that the potato was introduced into Irish cultivation by a philanthropic Englishman, Sir Walter Raleigh. There is an interesting old woodcut

showing the elegant Sir Walter standing in a potato field, supervising the digging of the first crop of tubers. Incidentally, Sir Walter is shown smoking a clay pipe—an obvious ancestor of the "dudeen" of a thousand comedy-Irish caricatures. If he really did bring to Ireland the comfort of tobacco as well as the solid sustenance of the potato, Sir Walter would almost seem to rate an advance in title to St. Walter, and a place not too far back of St. Patrick in the parade on the Seventeenth of March.

Science News Letter, March 17, 1945

Corn cribs constructed by early American Indians were built of cane.

Phosphate drinks, given cattle in sections where the soil is deficient in phosphorus, result in more productive breeding and better gains by calves; disodium phosphate and defluorinated triple super phosphate are used.

Facts ABOUT



POSTWAR WALKIE-TALKIE

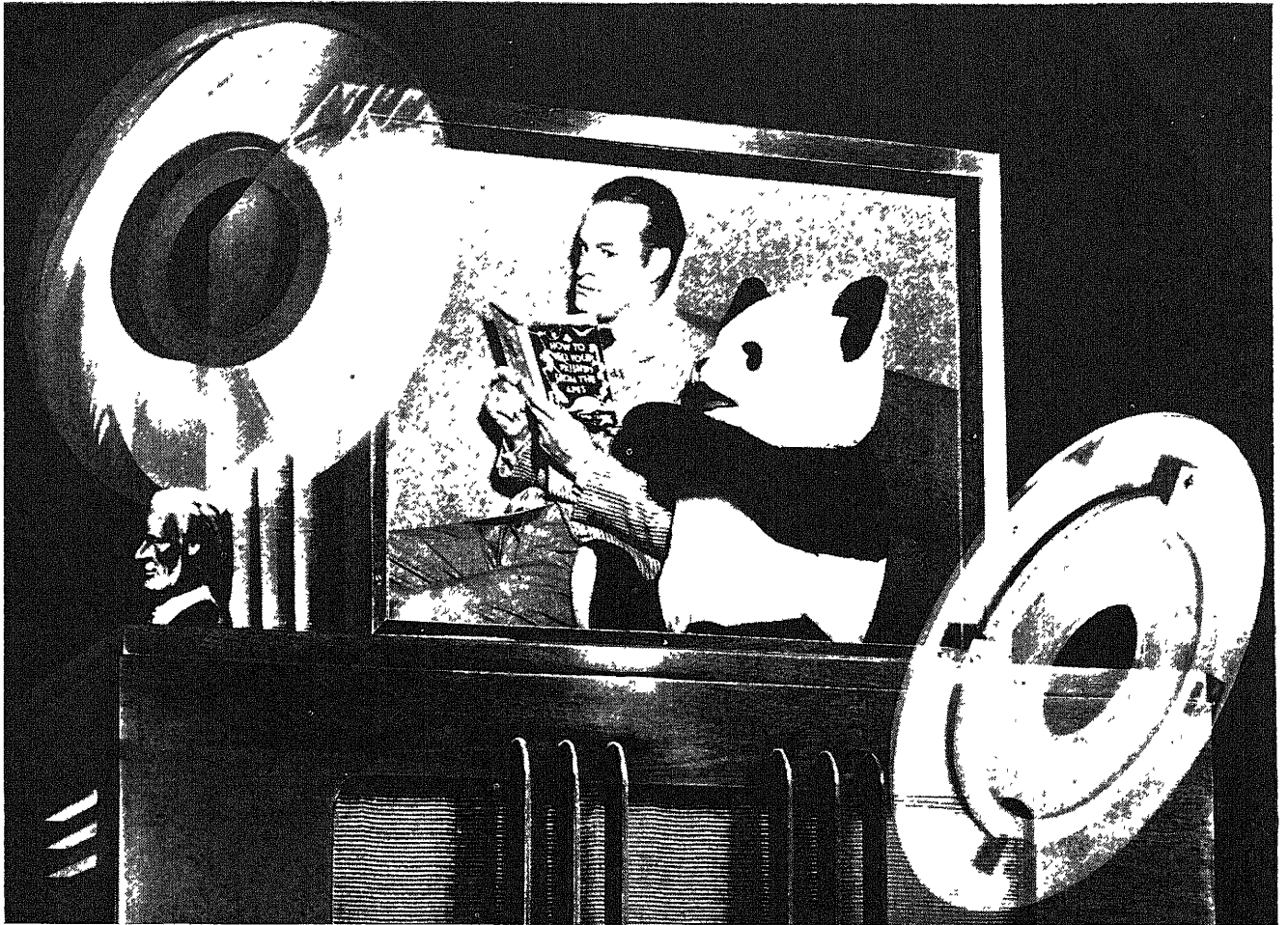
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Science Service Radio Feature



RCA Laboratories model with an 18 by 24-inch screen showing how Bob Hope may appear on future home television.

New Projection Television - Bob Hope's face "big as life"

Can you picture Bob Hope on television . . . seeing his face *big as life*—right in your own living room?

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This revolutionary improvement was achieved in RCA Laboratories by development of an entirely new reflector and lens, shown in phantom above. This lens, of inex-

pensive plastic, is 8 times as efficient for the purpose as the finest optical lens.

When you buy an RCA radio, phonograph or television receiver—or any other RCA product—you receive the benefit of the latest research development of RCA Laboratories. It is this *plus value* which is your assurance of lasting satisfaction.

The widespread public recognition of this plus value has given to RCA world leadership in the radio, phonograph, television and electronic art.



Dr. D. W. Epstein with a projection television tube, reflector and lens unit. Here the image on the end of the tube hits the reflector, is corrected by the lens, projected to the screen, then enlarged . . . making possible larger and clearer television than ever before.

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Books of the Week

➤ **POSTWAR** uses of plastics as well as wartime applications, figures giving details of the tremendous growth of this industry where the consumption of plastics materials has been multiplied about six times in six years, and information on recently developed materials such as silicones and polycarbonates are given in the 1945 **PLASTICS CATALOG**, (*Plastics Catalog Corp.*, \$6.).

Science News Letter, March 17, 1945

➤ **THE COMET OF 1577**, visible in most of Europe and in Asia, made it possible for Tycho Brahe and a small group of his contemporaries to prove that comets do not enter the earth's atmosphere, but are farther away from the earth than the moon. C. Doris Hellman gives the comet its proper place in the history of astronomy by tracing the development of theories on comets up to that year and discussing representative bits of the literature about **THE COMET OF 1577**. (*Columbia Univ. Press*, \$6.)

Science News Letter, March 17, 1945

➤ **THE SCIENCE** of navigation, in language understandable to the average boy of high school age, is discussed in **PRACTICAL MARINE NAVIGATION**, by James A. Stowell, a text book for beginners. The author has had years of experience both at sea and in professions connected with it. The book covers subjects and problems used in everyday navigation. (*Wesley*, \$2.50.)

Science News Letter, March 17, 1945

➤ **HOW ASTRONOMERS** can find out so much about the stars is told in **TELESCOPES AND ACCESSORIES** by Dr. George Z. Dimitroff and Dr. James G. Baker of Harvard College Observatory (*Blakiston*, \$2.50),

which contains a description of the principal instruments and procedures used in astronomical observations. Beginning with a discussion of light itself, the book brings you to the point where you can construct your own photographic telescope for use in the home workshop. You will enjoy reading it as well as learn much about small and giant telescopes which nightly sweep the sky.

Science News Letter, March 17, 1945

Just Off the Press

ALCOHOLICS ARE SICK PEOPLE—Robert V. Seliger—*Alcoholism Publications*, 80 p., \$2.

ARCHAEOLOGICAL EXPLORATIONS IN JO DAVIESS COUNTY, ILLINOIS, the Work of William Baker Nickerson (1895-1901) and the University of Chicago (1926-32)—John W. Bennett—*Univ. of Chicago Press*, 168 p., paper, illus., \$3.

THE CONSTITUENTS OF WHEAT AND WHEAT PRODUCTS—C. H. Bailey—*Reinhold*, 332 p., illus., \$6.50 (*Am. Chemical Soc. Monograph Series*).

THE DISTRIBUTION OF THE BIRDS OF CALIFORNIA—Joseph Grinnell and Alden H. Miller—*Cooper Ornithological Club*, 608 p., illus., \$7.

THE MAGIC POWDER, History of the Universal Atlas Cement Company and the Cement Industry—Earl J. Hadley—*Putnam*, 382 p., illus., \$3.50.

NATIONAL FIRE CODES, Vol. I, Flammable Liquids, Gases, Chemicals and Explosives—Robert S. Moulton, comp.—*Nat. Fire Protection Assn.*, 591 p., illus., \$3.

PLASTICS, SCIENTIFIC AND TECHNOLOGICAL—H. Ronald Fleck—*Chemical Pub. Co., Inc.*, 325 p., illus., \$6.50.

PSYCHOLOGY FOR THE RETURNING SERVICEMAN—Irvin L. Child and Marjorie Van de Water, eds.—*Infantry Journal*, 243 p., paper, illus., 25c.

SMALL FARM AND BIG FARM—Carey McWilliams—*Public Affairs Committee, Inc.*, 31 p., paper, illus., 10c (*Public Affairs Pamphlet*, no. 100).

WOOD TECHNOLOGY, Constitution, Properties and Uses—Harry Donald Tiemann—*Pitman*, 328 p., illus., \$4, 2nd ed.

WOODWORKING PROJECTS FOR INDUSTRIAL ARTS STUDENTS—Gerald Baysinger and Hartley H. Schaal—*McGraw*, 151 p., illus., \$1.40.

Science News Letter, March 17, 1945

EMBRYOLOGY

Chemical Structure of Embryos Now Studied

By DR. GEORGE W. CORNER

Carnegie Institution of Washington; Department of Embryology, Baltimore

Address given before the Science Talent Institute.

➤ **ALMOST** every high-school student of biology begins to study embryology by observing the development of frogs' eggs into tadpoles and adult frogs. The embryology of man and other high animals begins in the same way, by describing the embryo at various stages of growth, to see how the tissues and organs of the body are laid down and unfolded. The advance of modern science, bringing chemistry and physics closer to biology, has added countless new problems and opened new opportunities for explaining the growth of an embryo in terms of its chemical structure. Nowadays an embryological institute, while still based on the microscopical study of individual specimens, is also an experimental laboratory in which the investigators are likely to use such tools as hormones and enzymes, X-rays, and radioactive elements produced by the cyclotron, in order to understand the internal physiology of the embryo.

Science News Letter, March 17, 1945

Musk rats, valuable for both meat and fur, can be grown successfully in captivity, but the plan has not yet been found generally profitable.



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CONCLUSION:

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For the Western Electric Company, the manufacturing unit of the System, the Laboratories

develop equipment, prepare specifications, and engage in various engineering activities.

For the Armed Forces of the United States, under contracts of the Western Electric, the Laboratories have undertaken more than a thousand development projects — many with spectacular effect upon our enemies.



BELL TELEPHONE LABORATORIES *explore and invent, devise and perfect for our Armed Forces at war and for continued improvements and economies in telephone service.*

New Machines and Gadgets

✿ **SLEEPING BAG**, recently patented, has a projection at the head end that can be turned back over the sleeper's head and held by two rods in a sloping position to protect him from rain. A netting, inserted in the side of the bag over the user's face, permits fresh air to enter and keeps mosquitoes out.

Science News Letter, March 17, 1945

✿ **COMBINED PRESS** for forming plastic articles and an electronic heating unit is in successful operation and is effecting great economies in production time. The plastic articles are quickly molded into shape, and the curing process by high-frequency electric current is a proven success on small parts.

Science News Letter, March 17, 1945

✿ **MUD SHOES** for boggy land have center flat strips of wood strapped to the feet like skates, and hinged side and toe pieces held horizontally by springs. When pulling the foot out of mud these hinged pieces turn downward, narrowing the tread in a manner somewhat similar to the action of a cow's cloven hoof.

Science News Letter, March 17, 1945

✿ **NON-COLLAPSIBLE** golf bag, which does not tend to drop from the clubs when leaned against an object, is made of a light fabric, with rigid rings at the top and bottom connected by a slat. It has individual pockets for each club, made of crimped material to hold the clubs in place.

Science News Letter, March 17, 1945

✿ **ELASTIC BANDAGE**, for minor ailments that require support without rigidity, is made of a fabric interwoven with a



vinyl resin yarn that possesses natural elasticity. The picture shows how it is applied. The fabric in use is said to be durable, to retain its elasticity, to be flexible, and to permit circulation and ventilation.

Science News Letter, March 17, 1945

✿ **PURIFIED WATER**, claimed to be the equivalent of distilled water, is obtained by filtration in a special apparatus in which the water is passed through beds of melamine-derived and other resins. They are reported to transform the dissolved salts in the water to corresponding acids and absorb the acids.

Science News Letter, March 17, 1945

✿ **INTERNAL COMBUSTION** engine, patented, has no pistons, valves, timing or other conventional parts. Combustion takes place within tubes embedded spirally in a cast rotor. The high velocity of the combustion, traveling to the exhausts, strikes curving spiral walls, thus spinning the rotor.

Science News Letter, March 17, 1945

✿ **CUT-OUTS** of colored flowers and other designs, to be used for decorating furniture, walls, trays and other household articles are made, like a postage stamp, with a dry paste on their backs. When dipped in water, applied and dried, they remain in place and are fadeproof and washable.

Science News Letter, March 17, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 250

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Question Box

ASTRONOMY

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BOTANY

How are corn plants grown in vials? p. 168.

CHEMISTRY

What new substances are produced by polymerizing silicones? p. 169.

What is one new method of chemical food preservation? p. 168.

Where will the new underground helium storage reservoir be located? p. 170.

DENTISTRY

How may caries be prevented in the future? p. 163.

GENERAL SCIENCE

Who are the two top winners in the Fourth Annual Science Talent Search? p. 163.

MEDICINE

How are antimalarial drugs now being tested? p. 170.

How successful has penicillin been for treating babies born with syphilis? p. 169.

In what form is the penicillin that is now on sale in drug stores? p. 168.

Why is it important to use sulfa drugs with caution? p. 168.

PHYSIOLOGY

What is the latest evidence of great economy in the animal body's use of mineral elements? p. 167.

Where published sources are used they are cited.

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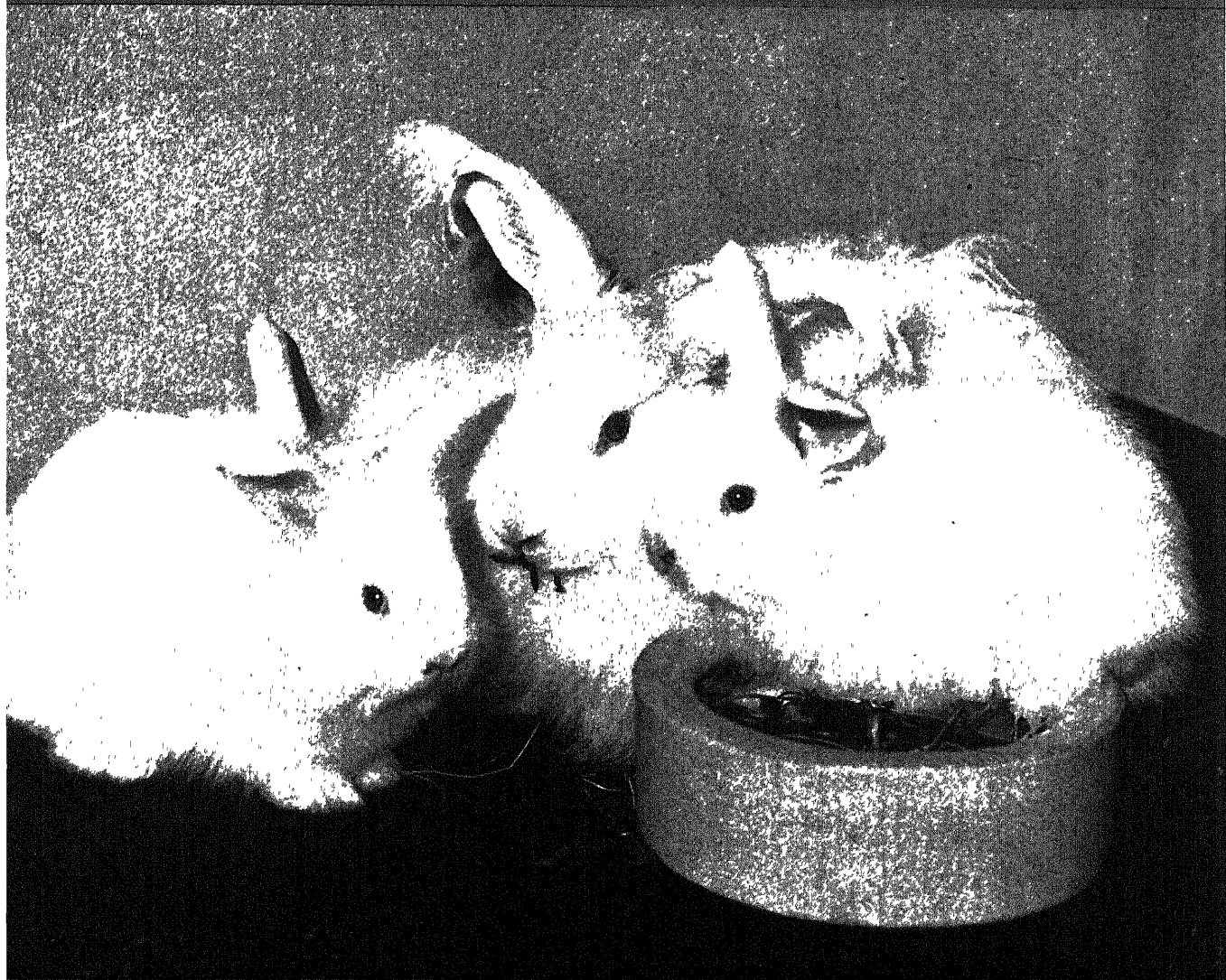
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1-3 MAR 1952

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 24, 1945



For Easter
See Page 182

A SCIENCE SERVICE PUBLICATION

Helping the sick get well



LAMPS that kill germs . . . X rays to guide the surgeon's fingers . . . operating rooms bathed in glareless light . . . air conditioning to screen out street noises and dust.

Helping the sick get well is only one of the contributions of General Electric. From the research and engineering in G.E.'s laboratories come products to make your work easier, your home brighter, creating new comforts, better jobs.

The pictures you see here are typical of things accomplished for you by G-E research and engineering. General Electric Company, Schenectady, N. Y.



Mirror of D-Day injury! How X rays speed treatment of war injuries is shown in this picture of Seaman Brazinski's thigh. On D-Day a German mine shattered his boat, blew him 20 feet in air. Rescued by an LST, rushed to England, X rays quickly defined his injury, permitted accurate setting. Portable G-E

X-ray machines at St. Albans Naval Hospital, L. I., regularly check his progress. Through the skill of doctors 97 per cent of the wounded in this war are saved. The modern form of X-ray tube was invented by Dr. W. D. Coolidge, G-E scientist. X-ray units built by the G.E. X-Ray Corp. are at battlefronts the world over.



New lamp kills germs . . . Germ-laden air is purified by the new G-E germicidal lamp. It is already at work in hospitals, in battle-front operating rooms. Tried in a school classroom during a measles epidemic, only one-fourth as many children contracted measles as compared with unprotected classrooms.

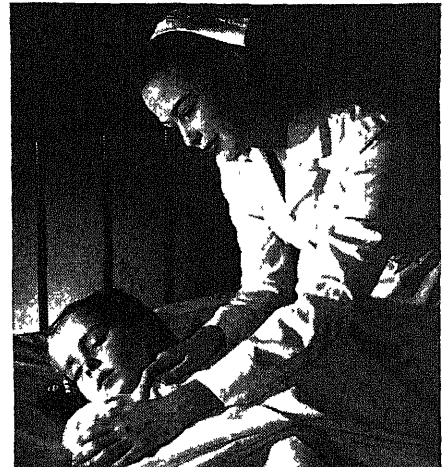
★

Hear the G-E radio programs: *The G-E All-girl Orchestra*, Sunday 10 p.m. EWT, NBC—*The World Today news*, Monday through Friday 6:45 p.m. EWT, CBS—*The G-E House Party*, Monday through Friday 4:00 p.m. EWT, CBS.

FOR VICTORY—BUY AND HOLD WAR BONDS



Seeing the invisible . . . The electron microscope, more powerful than ordinary microscopes, gives doctors a new tool to fight disease. Here is the germ, *bacillus subtilis*, magnified 8,000 times. G-E engineers are working to make available a portable electron microscope for industry.



Helps treat Infantile Paralysis . . . Doctors wanted hot packs to relieve pain and reduce muscular spasms, but such steam packs tended to burn. G-E workers put together a machine for hospital use that produces heated packs that even at 180°F. will not burn the patient's skin.

GENERAL  ELECTRIC

MEDICINE

Don't Waste Penicillin

Though there is now enough for general civilian use as well as for the armed forces, the precious drug should not be used except for certain conditions.

➤ EVEN though there is now enough penicillin for general civilian use as well as for the armed forces, there is not enough of it to waste any. Use of the precious mold chemical in conditions which it does not remedy would be a waste.

Experience with over 5,000 cases which have been carefully studied under the auspices of the National Research Council and the Office of Scientific Research and Development show that penicillin is good for the following conditions:

1. All staphylococcal infections with and without blood stream involvement including acute and chronic osteomyelitis, carbuncles and soft tissue abscesses, meningitis, cavernous or lateral sinus thrombosis, pneumonia, empyema, carbuncle of the kidney, wound infections, burns and endocarditis (a form of heart disease).

2. All cases of clostridia infections, which includes gas gangrene.

3. All hemolytic streptococcal infections with invasion of the germs into the blood and all serious local infections. The list of these conditions includes cellulitis, mastoiditis with brain involvement, pneumonia and empyema, childbed fever, peritonitis and endocarditis.

4. Childbed fever and local infections due to anaerobic infections.

5. Meningitis, pleurisy and endocarditis due to pneumococci and all sulfa-drug-resistant pneumococcal pneumonia.

6. All gonococcal infections, including those complicated by arthritis, eye trouble, endocarditis, peritonitis and epididymitis.

7. All cases of anthrax.

8. All cases of chronic pulmonary suppuration in which operations are contemplated.

9. All meningococcal infections in which sulfa drugs fail.

10. All cases of bacterial endocarditis in which the heart trouble is due to germs susceptible to penicillin.

Syphilis is listed as a condition in which penicillin has been found effective but its position not definitely defined.

Influenza, tularemia, undulant fever,

tuberculosis, acute rheumatic fever, acute and chronic leukemia, malaria, infantile paralysis, virus infections and cancer are listed, along with a number of less familiar ailments, as conditions for which penicillin should not be used because it does not have any effect on the illness.

Science News Letter, March 24, 1945

Rushed by Air

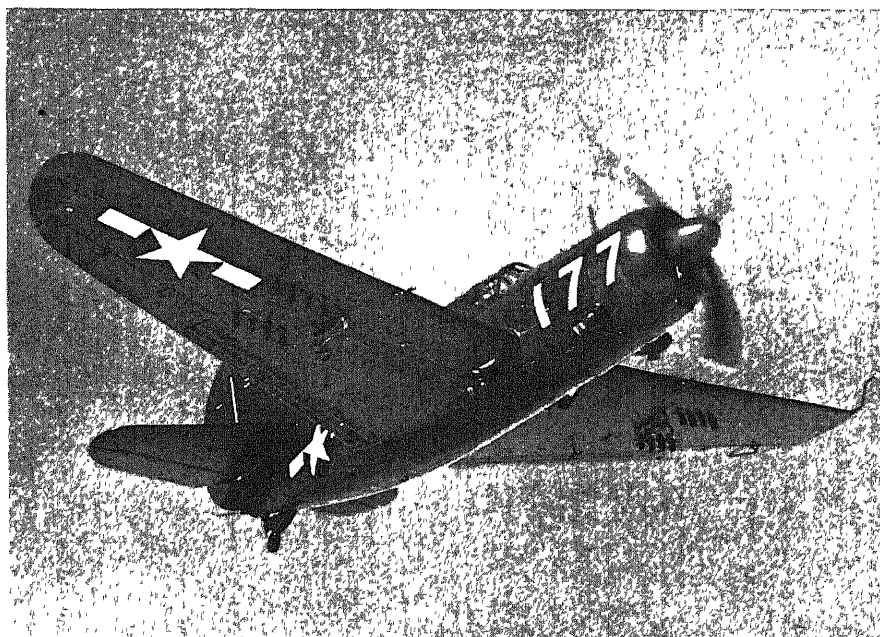
➤ A HUNDRED and thirty billion units of penicillin, or about 6,500,000 doses of the life-saving mold chemical, were rushed to the nation's drug stores, hospitals and drug supply houses for civilian use which began on March 15.

Between that date and April 1, a total of 130,000,000,000 units will be available for civilian use by War Production Board allocation. (From 5,000 to 40,000 units are needed in each injection, depending on the illness.) This is more than three times as much as has ever been released for an entire month by WPB's civilian

penicillin distribution unit in Chicago. For the month of April, the civilian allocation will be increased to 150,000,000,000 units. After that, monthly allocations are expected to be increased each month.

The nation's airlines are carrying large quantities of the life-saving chemical, which must be kept at a temperature of 50 degrees Fahrenheit or less. Some of it, from E. R. Squibb and Sons and Winthrop Chemical Co., was shipped by air express during the first week in March, in anticipation of the new WPB allocation. Cheplin Laboratories, at Syracuse, N. Y., shipped in excess of 5,000,000,000 units, most of it by air express, to about 200 distribution centers throughout the United States during Wednesday night, March 14, and Thursday morning, March 15. Charles Pfizer and Co., with a March allocation of over 50,000,000,000 units, is shipping to six large distributors.

Although penicillin for civilian use will go into drug stores, it probably will not go directly from the producers to the neighborhood druggist or the physician. Like many other drugs, it will go from producer to local distributor and thence to the drug store and the physician. Some of the penicillin producers are drug producers with their own distribution centers. Others are chemical manufacturers who never before have been medical distributors and will dis-



CURTISS SB2C-4—Looking deadlier than ever in the Navy's new all-midnight blue camouflage, this is the newest version of the SB2C Helldiver dive-bomber and is revealed to carry one of the greatest loads of destructive power ever mounted in a single-engine aircraft. (See SNL, March 3.)

tribute through firms already in this business.

Science News Letter, March 24, 1945

Doctors Worried

➤ WITH THE release of penicillin for general civilian use, physicians are beginning to worry over its possible indiscriminate use, particularly if and when it becomes available in forms the layman can give himself. These may include pills, lozenges, chewing gum, dental paste, vaginal jelly, face creams, shaving pastes and similar products.

Two physicians, Lieut. Leslie A. Falk, of the Army Medical Corps, and Dr. Herman Goodman, of New York, have already written to the editor of the *Journal of the American Medical Association* on the subject. Their letters appear in the March 17 issue of the journal.

Development of a sense of false security is perhaps the greatest danger, in the opinion of Lieut. Falk.

"Penicillin is of no use in many diseases, and in others there is danger from inadequate dosage," he points out. "For example, it is not hard to visualize that a patient with a chancre would hear that penicillin cures syphilis, would get hold of some, take it (or have it administered) in inadequate dosage, see his chancre dis-

appear, feel that he has been cured of the disease, and then develop cerebrospinal or cardiovascular syphilis many years hence. Numerous other examples can be imagined, and some have probably already occurred."

Danger of inadequate dosage is also stressed by Dr. Goodman. He suggests that not only will sick people in such cases fail to get well but that "a large army of infection carriers" may develop from persons who have not had enough of the mold chemical to eradicate the germs.

A person treating his own strep sore throat with penicillin cough drops or chewing gum is probably one example of what Dr. Goodman fears. Such a person might absorb enough penicillin to make him feel better but not enough to clear up the infection and he would go around spreading it to others.

Continuing research on best methods of using penicillin, and prevention of its abuse by the industry, medical and pharmaceutical professions and government agencies are urged by Lieut. Falk. He also stresses the need to retain enough government control to prevent development of shortages through misuse of the precious material and to prevent a "riot of commercial penicillinization of our population."

Science News Letter, March 24, 1945

ORDNANCE

Rockets Prove Themselves

➤ THE TREMENDOUS destructive power of rockets has proved these new offensive weapons as effective against enemy ground units and moving targets. A report on the results of 323 sorties in which 1,117 rockets were expended showed that 35 locomotives, 85 tanks, 15 armored cars, 164 motor transports, 19 gun positions, 9 aircraft hangars, 6 warehouses and factories, 36 good cars and 2 ships had been destroyed in the European theater of war, by one squadron over a period of two months. This means that a total of 362 items were destroyed by rockets. About 35% of the rockets were destructive hits.

An analysis of these figures, prepared at the Fighter Gunnery school of the Army Air Forces at Foster Field showed that an average of three or less rockets are fired to get one of them accurately knocking out an enemy locomotive, a motor transport or a gun position. About five rockets are expended for each tank knocked out, tanks being such small tar-

gets that they are harder to hit.

Rockets have terrific penetration effect, but little fragmentation effect on enemy targets. A five-inch rocket launched from a P-47 or a P-38 can cut through three feet of reinforced concrete and four feet into semi-reinforced concrete. This is equivalent to the fire power of a Navy five-inch gun. Rockets thus turn a fighter plane into flying battleship.

Trained fighter pilots learn to launch rockets and fire bullets from swift combat ships at this school under the direction of Col. H. H. Van Auken, a veteran of 17 years' service with the Army Air Forces. The actual firing of machine guns and rockets by flyers is accomplished at Matagorda Peninsula on the Gulf of Mexico.

Launching a rocket from a plane is no simple procedure. Rockets are affected by the airspeed of the plane, dives, maneuvers and other factors. Slipping or skidding a plane can cause a rocket to completely miss its target. While the line of

sight to the target is the direction in which the plane is pointed, a slip or skid may cause the rocket to travel at 600 miles an hour at an angle of 45 degrees to the target. These factors, and others, must be taken into consideration by fighter pilots who are also gunners and rocketeers.

Science News Letter, March 24, 1945

Dogfish shark, the liver of which is now America's chief source of vitamin A, is so called because of its great appetite for fish; the Pacific dogfish, closely related to the Atlantic variety, is a four-foot gray shark.

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MEDICINE

Measles Affects Eyes

Cataracts of a peculiar type and other congenital defects may occur in babies whose mothers have German measles during the first months of pregnancy.

➤ CATARACTS of a peculiar type and other congenital defects may occur in babies whose mothers have German measles during the first three months of pregnancy. Discovery of this new hazard to infant health was made by Australian medical scientists and has since been confirmed by American scientists.

First to report the matter was Dr. N. McA. Gregg of Australia, who recorded 78 cases of a new type of congenital cataract occurring in babies between December, 1939, and January, 1941. With few exceptions, the babies' mothers had suffered from German measles during the early stages of pregnancy. Most of the babies were small, undernourished and difficult to feed and 44 of them also were born with heart defects.

Because similar cases had occurred in South Australia, five medical scientists of the Institute of Medical and Veterinary Science at Adelaide, Charles Swan, A. L. Tostevin, the late Brian Moore, Helen Mayo and G. H. Barham Black, investigated the matter under the auspices of the Australian National Health and Medical Research Council.

All physicians in South Australia were asked to send information about babies whose mothers had German measles or other illness with a rash during pregnancy. As many mothers as possible were interviewed. Information about the illness was obtained, to make certain whether it was German measles, and information about the babies' health was also obtained.

The mothers of 49 babies in this investigation suffered from German measles during pregnancy. In 31 of the babies congenital defects were found. These included cataract, deaf-mutism, heart disease, microcephaly (abnormal smallness of the head), and mental retardation. As the children develop, the doctors state, it is possible that other defects may become evident.

German measles is such a common disease that it is strange, the scientists point out, that congenital defects in offspring whose mothers suffered attacks during pregnancy have not been noted before. It may be, they suggest, that the virus which causes the disease has be-

come more virulent or undergone some more subtle change within the past few years.

The next step in dealing with the problem, they state, should be to isolate the germ that causes German measles with the object of preparing a vaccine against it. In the meanwhile they suggest studying the effects of giving convalescent serum to expectant mothers who have been exposed to German measles and also to all pregnant women who have not already had an attack of the disease.

Science News Letter, March 24, 1945

ETHNOLOGY

Figure With Bell Is Modern Maori Art

A letter to the Editor from Te Rangi Hiroa (Peter H. Buck), Director of the Bernice P. Bishop Museum, Honolulu, Hawaii:

➤ "ON THE front cover of SCIENCE NEWS LETTER of January 13, there is an excellent illustration of a Maori carved figure with a mouth opening that passes completely through the head and is capacious enough to permit of a bell being suspended from its palate. This unique figure is labeled as an 'Ancient God' (following U. S. Navy photo caption), and the text states that 'American archaeologists say that not much is known to science about these Maori images, and one archaeologist expressed concern that a modern dinner bell has been placed in such an archaeological treasure.' It is evident that the archaeologists consulted know nothing about modern Maori art which is to be expected as the subject does not fall within the field of archaeology.

"The explanation of the figure is as follows. To prevent the Maori craft of carving from dying out, the New Zealand government established a School of Maori Carving at Rotorua (not Rotarua) after 1920. The Maori students were selected from various tribes and they were taught not only to copy old models, but also to adapt the craft to the production of objects which would serve modern requirements. The carved figure in your illus-



MODERN ART

tration was made expressly for the bell which is more of an 'archaeological' object than the wooden stand. Thus, by no stretch of the imagination can the carving be regarded either as an 'archaeological treasure' or as an 'ancient god.' I knew the Maori villages at Rotorua very well indeed and the bell stand was not there when I left New Zealand in 1927. It must have been carved since then and it cannot be older than 17 years at the most.

"The Maoris do not mutilate ancient objects, but they can create new objects which retain the atmosphere of their ancient craft. The bell stand is a fine example of modern art and American archaeologists, as well as your reading public, may enjoy it for what it is without worrying about any additional unsolved mysteries."

Science News Letter, March 24, 1945

CHEMISTRY

Bubbles of Carbon Dioxide Used in Floating Soap

➤ A NEW and very simple method for preparing floating soap is the subject of patent 2,371,175, granted to Charles W. Kelley of Duck Hill, Miss. Most floating soaps have air whipped into them, in larger or smaller bubbles; this requires special machinery. The present invention contemplates the use of bubbles of carbon dioxide. These are generated by the addition to the melted soap mass of a small quantity of sodium bicarbonate, which "fizzes" on contact with the soap's ordinary mildly acid constituents.

Science News Letter, March 24, 1945

MILITARY SCIENCE

Air Successes Measured

Combat movies show the effectiveness of fighter planes in attacks on the enemy; fighter pilot has much in common with caveman.

► THE INCREDIBLE success of Army Air Force fighters in their attacks on enemy planes and ground targets was shown when combat films taken in the European theater were displayed at Foster Field, Texas. The movies, taken with a 16-millimeter camera mounted on the gun of the plane, show where the bullets hit the enemy, where the bullets were missing and why they missed. Thus these films become gunnery instructors for pilots in combat and valuable visual aids in training fighter pilot gunners for combat.

While viewing film after film taken in the heat of combat and while seeing enemy radar stations, locomotives, transports, rocket planes and other units burst into flame before your eyes, you realize that the modern fighter pilot has much in common with our hairy ancestor, the caveman.

The caveman's weapons were a rock and a club. He wasn't very effective when his target was too far away. It was beyond his maximum effective range.

The fighter pilot has better weapons, speedy planes, machine guns, and electronically operated computing sights through which he can line up his target. Yet he, like the caveman, is not very effective when he is out of range. The caveman knew he could throw rocks when he was within throwing distance. Our fighter pilots can knock 'em over when they are within effective shooting distance, which gunnery experts call the maximum limit of effective range.

The closer a fighter pilot approaches his target the more deadly he can be. At 500 feet his aim is more deadly than at 1,000 feet. The maximum effective range of our fighter plane's bullets is 1,200 feet. The ideal firing range is 750 feet.

Fighter pilots are not born with a knowledge of good shooting. They acquire it through hard work and much practice. The training they receive today is under the supervision of Lt. Gen. Barton K. Yount, commanding general of the AAF Training Command.

Some of the things student fighter pilots learn at this school for fixed gunnery are that they can destroy aerial targets

more quickly and with less danger to themselves when they hit from the side. A target moving straight away from them or straight toward them does not appear to move; they can hit this type of target by aiming directly at it. They must aim ahead of a target moving across their line of sight. The faster the target, the farther ahead they must aim. This is the same thing a football player does when he throws a pass. The faster the receiver, the farther ahead of him he throws the ball. Technically this is called deflection allowance.

Flying three types of fighter planes, the P-38, P-47, and P-51, pilots learn the latest techniques in fixed gunnery to prepare them for their new role of supporting ground troops. Firing at wire mesh tow targets, each fighter plane uses .50 caliber bullets dipped in red, green, yellow or black paint. When the bullet hits the target its hole is rimmed with color, so that when the target is brought in and scored, each pilot knows how many hits he got.

For training at hitting ground targets, fighter pilots pour a stream of bullets at a simulated hut located in a 75-foot circle. The planes dive down from an altitude of 11,000 feet and begin firing at between 4,000 and 5,000 feet.

Bombing runs, using 3.5-pound practice bombs, are started from 5,000 feet and 3,500 feet, coming in over the target which is usually a simulated airplane, at great speed.

Science News Letter, March 24, 1945

ZOOLOGY

Angora Rabbits Increased Greatly Since War Began

See Front Cover

► SOFT CAPS for babies and fuzzy mittens for evening wear are now being made from Angora wool produced in the United States from rabbits like those shown in the photograph by Fremont Davis, Science Service staff photographer, on the cover of this SCIENCE NEWS LETTER. Before the war thousands of pounds of this soft white wool were imported each year from Europe, three-

fourths of the total supply coming from France. Today hardly any Angora rabbit wool reaches America from abroad and the local industry is beginning to flourish.

The wool, which may grow from five to eight inches a year on these rabbits, may be either sheared or plucked. Spinning mills pay a premium for plucked wool actually pulled out by hand at the time of molting. Breeders pluck the rabbits three or four times a year.

Barber shears or electric clippers similar to those used on sheep may be used to shear Angora rabbits. If done about four times a year, the hairs attain a length of two and a half to three inches each quarter. From a mature animal not nursing young, about 12 to 16 ounces of wool may be sheared each year.

Little if any grooming between shearing periods is needed, provided the rabbits are properly cared for and the shearing done every 10 to 12 weeks. If the coat is allowed to grow for a longer period, the fibers are likely to become tangled and matted.

There are two types of Angora rabbits—the English and the French. The English, with its much softer wool, has a broad head and short ears. This type is well trimmed with ear tassels and bangs. The French, of a larger, more rangy build, has coarser wool. At present the price of wool is the same, since there is not enough of either type to ship alone.

During spinning and weaving the wool tends to fly, much of it dropping out or becoming entangled in the wheels of the machines. Thus at present few mills are equipped to handle Angora rabbit wool. The wool, frequently dyed lovely pastel shades, is not as sturdy as other types of wool and a binder is always used to give the thread added strength.

The type of wool best fitted for mill use and whether it is better to pluck or shear the rabbits is being studied by the Fish and Wildlife Service of the U. S. Department of the Interior in cooperation with the Bureau of Animal Industry of the U. S. Department of Agriculture. Rabbits with an even more plentiful supply of this soft, fuzzy wool may result from breeding studies now in progress.

Science News Letter, March 24, 1945

Paper wrappers on tomatoes during shipment in cold storage should be removed when the tomatoes are placed in a warm room to ripen because the cold vegetable causes moisture to condense in the paper which helps decay organisms.

ASTRONOMY

Spicules Short-Lived

➤ TINY prominences of the sun have been found to be much more frequent and of shorter duration than was previously realized. These spike-like prominences, called spicules, lasted only four or five minutes from the time they were first detected until they faded out entirely.

The existence of a large number of these spicules, which had previously been noticed in some of the best eclipse photographs, was discovered in a series of photographs taken with the coronagraph at the Fremont Pass Station of Harvard College Observatory, Climax, Colo., by Dr. Walter O. Roberts.

The typical spicule showed up first as a barely detectable lump on the limb of the sun. The lump rapidly enlarged, growing both broader and taller, and was brightest just before it reached its full height.

After the prominence had reached its maximum elongation, which occurred usually a minute or two after it first appeared, it began to fade out gradually without any detectable motion.

The entire lifetime of most of the spikes from first to last appearance was on the average only four or five minutes. These tiny prominences usually were about 4,500 miles wide. They were but 1,700 to 1,800 miles high, as contrasted with some of the larger solar prominences which sometimes are 500,000 miles high.

The largest spicules sometimes last 11 minutes, and some of the smallest only two minutes. The small ones probably occur numerously, and the large ones only occasionally.

At a given moment it is frequently possible, Dr. Roberts reports, to see at one time as many as 25 of the spicules in a 60 degree arc in the polar regions of the sun.

Typical spicules erupt more frequently from regions of the sun which usually show little disturbance of any sort. They are not likely to occur near large prominences or in areas where there are sun-spots. They are most commonly seen in polar regions where such disturbances are infrequent.

The photographs from which the study of the spikes was made were taken at the rate of one picture each minute. Special sensitized film prepared for use on prominence photographs was employed.

The spicules may possibly be a link

between the solar granules and polar coronal plumes, but further study will be needed. The spicules are the only solar features so far known which seem to indicate a continuous flow of material out through the chromosphere, the gaseous layer of incandescent hydrogen which surrounds the sun, into the regions of the sun's corona.

Science News Letter, March 24, 1945

TECHNOLOGY

Heavy Rolling Produces Improvement in Leather

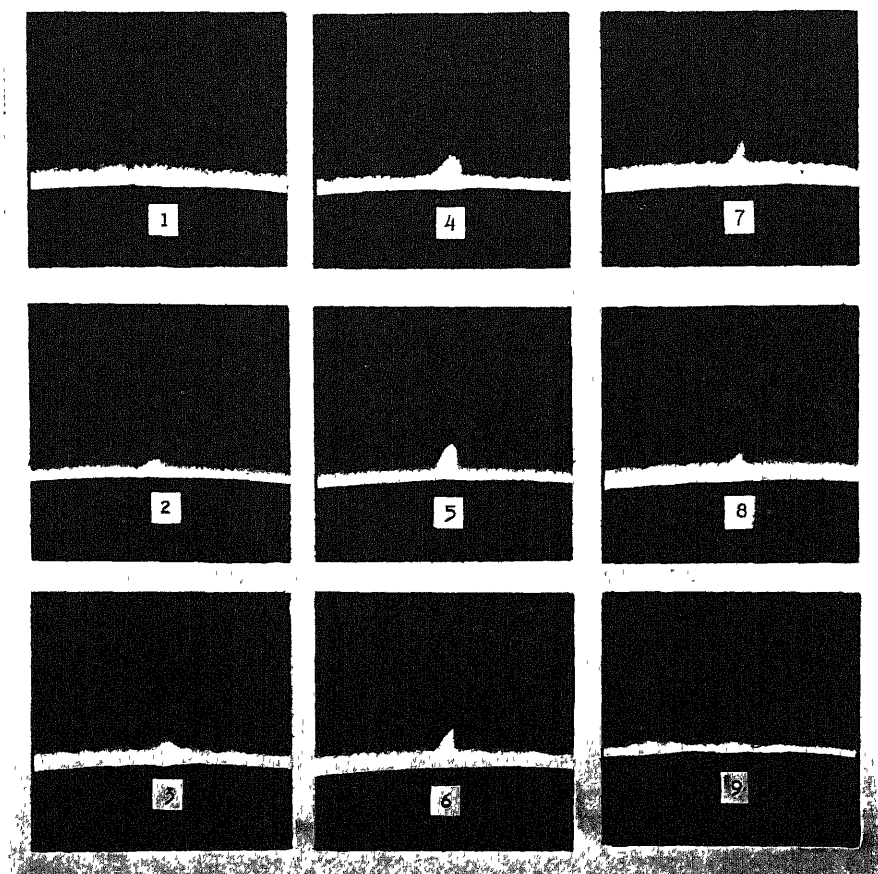
➤ HEAVY rolling of shoe sole leather, or compression by other means, produces an improvement in wear, it is

found by recent tests made by the National Bureau of Standards, in which a regiment of soldiers in an officer candidate camp were used, together with some civilian workers in war industries.

The tests showed also that differences in the wearing quality of 20 commercial tannages of vegetable sole leather were very small, with no significant difference in the wear of leather tanned from domestic and from cold-storage hides. They showed further that water-soluble materials and grease are lost from soles in service, the greatest loss being shown by water-soluble ash.

The so-called "rubber" abrasive machines are of little use, it was found, in predicting the wearing qualities of tannages. The wearing quality can be estimated, to a degree, by the water-soluble content, the firmness, and the degree of tannage of the leather.

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SHORT-LIVED—Tiny prominences rising from the brilliant gaseous layer surrounding the sun, spicules last only a few minutes and disappear. The average spicule passes through all the stages shown in this series of photographs taken by Dr. Walter O. Roberts, of Harvard College Observatory, in but four or five minutes. It is usually brightest in its early stages, as shown in the fourth picture.

SEISMOLOGY

Japanese Homeland Again Shaken by Earthquake

➤ ANOTHER earthquake has shaken the Japanese homeland, seismologists of the U. S. Coast and Geodetic Survey announced after examining data transmitted through Science Service by five observatories in this country. The shock, of only moderate intensity, had its epicenter in the region of latitude 38 degrees north, longitude 136 degrees east. This is near the Noto peninsula, on the west coast of Honshu, the island on which Tokyo and most of Japan's other large cities are located. The quake started at 5:37½ p.m., EWT, on Sunday, March 11.

Stations reporting were those of the Jesuit Seismological Association at Georgetown University and St. Louis University, the Utah State Agricultural College at Logan, Utah, and the observatories of the U. S. Coast and Geodetic Survey at Tucson, Ariz., and College, Alaska.

Science News Letter, March 24, 1945

MEDICINE

Some Diseases Cured by Swallowed Penicillin

➤ HOPE that in future patients can swallow their doses of penicillin instead of having them injected by hypodermic needle every three hours is increased by a report to the *Journal of the American Medical Association*, (Mar. 17)

Penicillin by mouth was effective in a number of cases of gonorrhea and other diseases, Drs. Paul Gyorgy, H. N. Vandegrift, William Elias and L. G. Colio of Philadelphia, and F. M. Barry and J. D. Pilcher of Cleveland report.

With the penicillin, trisodium citrate was given to act as a buffer against the acid in the stomach. Destruction of the mold chemical by the stomach acid before it could get into the blood and achieve its healing effect has been the difficulty heretofore in giving it by mouth. Penicillin is sensitive to alkali as well as acid, so giving it with an alkaline antacid was considered impractical and undesirable.

The gonorrhea patients were cured in one to three days with doses of penicillin comparable in amount to those given by injection for treatment of this disease.

A three-year-old boy with chronic otitis media (running ear) had been getting sulfathiazole for 23 days without any improvement. He was cured after 20 doses

of penicillin with sodium citrate had been given by mouth every three hours, which would take two and one-half days.

Penicillin could be detected in the blood, some of the studies showed, four hours after it had been swallowed, whereas it is rare to find it in the blood even three hours after injection into the muscles.

Science News Letter, March 24, 1945

RADIO

New Television Receiver Shows Brighter Pictures

➤ A NEW television receiver for post-war homes that projects pictures like movies that are brighter, clearer, and five times larger than were possible on prewar sets was demonstrated by Dr. C. B. Jolliffe, vice-president in charge of the laboratories of the Radio Corporation of America.

The screen of the new receiver is 16 by 21 1/3-inches in size and is made of a special plastic that has been treated to make the pictures show up brighter and clearer. It was made possible by four prewar technical developments which Dr. Jolliffe credited to RCA scientists and engineers. These include an improved high-voltage projection tube, a unique high-efficiency optical system, the plastic screen, and an automatic frequency control system.

Floor or console models incorporating the new television screen will cost about \$395, including equipment for picking up FM and standard broadcast (AM) programs. Several models, selling as low as \$150, will also be available. These less expensive models will be equipped with tubes for viewing pictures directly in a manner similar to that used in prewar television sets.

The optical system in the new television receiver consists of a bowl-shaped mirror and a specially designed molded plastic lens which delivers to the back of the viewing screen a picture six times brighter than could be obtained with an ordinary movie projector. The cathode ray receiving tube is mounted downward in the cabinet, with the bowl-shaped mirror below it and facing upward. Light from the face of the tube is reflected upward from the mirror through the plastic lens to a flat inclined mirror near the top of the cabinet. From the mirror, the light is reflected upon the back of the viewing screen. The entire receiver is not much larger than an average prewar radio receiver.

Science News Letter, March 24, 1945



CHEMISTRY

New Vitamin A Discovered, Twin to One Already Known

➤ DISCOVERY of a new vitamin A, twin to the one already known, is announced by C. D. Robeson and J. G. Baxter of the Laboratories of Distillation Products, Inc., in Rochester, New York.

In their report to the British scientific journal, *Nature*, they suggest calling these vitamin twins Gadol and Galol. Gadol comes from the Latin word for codfish and is given to the vitamin A which has long been known and was isolated in pure form about five years ago. Galol is derived from the word for shark, the fish from whose liver the second vitamin A was first isolated.

Existence of Galol has been suspected for some time but it eluded detection because it is present in smaller proportions in most fish liver oils. Its crystals are quite different in shape from those of the previously known vitamin A and it differs in some other respects, but it has similar potency as a vitamin. The two vitamins are believed to be geometric isomers.

Vitamin A is required for normal growth and health. Lack of it may lead to serious changes in the eye, including night blindness, and in other tissues of the body. Fish liver oils are the chief source of the vitamin, but foods such as carrots, sweet potatoes and green leafy vegetables furnish carotene which the body can convert into vitamin A.

Science News Letter, March 24, 1945

HORTICULTURE

Good Bread Made From Twenty-Year-Old Wheat

➤ WHEAT, kept over 20 years, still makes good bread if properly stored, report scientists of the U. S. Department of Agriculture and the Colorado Experiment Station. Baking tests with wheat kept 14 to 22 years in a dry, unheated room showed that the protein content was unchanged, the acidity had not increased enough to show up in the flavor of the bread, and the thiamin content of the wheat was still high.

Science News Letter, March 24, 1945

E FIELDS

NUTRITION

Spinach May Come Back Into Nutritionists' Favor

➤ **SIGNS THAT** spinach may get back into favor with nutritionists, if not with small boys, appear in a report by Dr. Roe E. Remington and Dr. Cecil L. Smith of the Medical College of the State of South Carolina. (*Science*, Mar. 16)

Junior could, if he would, eat as much as two and three-quarters pounds of spinach daily without having his growth stunted or his bones malformed, so long as his diet is not short in calcium, if the scientists' studies with rats can be transposed to humans.

Chief objection to spinach by nutritionists had been that some substance in it, presumably oxalic acid, interfered with the utilization of calcium for bone formation. In the course of experiments testing the availability of iodine in certain vegetables, Drs. Remington and Smith had occasion to feed a commercially prepared powdered spinach to young rats on a diet that for years had been successfully used as a breeding ration. They decided at the same time to test the effects of the spinach on growth and bone formation.

The rats ate daily what would amount roughly to two and three-quarters pounds of spinach in a human dietary of 2,500 calories. No decline in appetite or efficiency of food utilization was noted, their growth was not stunted, and there was no harmful effect on their bones, where calcium deficiency would show up.

Science News Letter, March 24, 1945

GENETICS-MEDICINE

RH Positive Sensitivity May Last for Lifetime

➤ **WARNING** that great care should be taken in giving blood transfusions to women with Rh negative blood who have given birth even as much as 16 years earlier to Rh positive babies is given in a report by Dr. Lawrence E. Young and Dr. Donald H. Kariher, of Rochester, N. Y. (*Journal, American Medical Association*, Mar. 17).

Some physicians have believed that the antibodies built up in the mother's bloodstream by the Rh positive infant, which may cause a violent reaction to transfusion with Rh positive blood, will

disappear in the course of three or four years.

"Sensitivity to the Rh factor," these investigators report, "once it is acquired, may persist for many years, probably for life."

Although physicians are accustomed to expect dramatic symptoms such as chills and fever as danger signs of transfusion with incompatible blood, serious reactions can take place without any of these dramatic warnings, the physicians report. And Rh incompatibility is often unpredictable by any sort of matching test.

"The importance of vigilance on the part of those in charge of transfusions and the necessity of systematic investigation of any untoward symptoms or signs cannot be overemphasized," the physicians warned.

They recommend that nothing but Rh negative blood be transfused into Rh negative patients regardless of how long it is since they gave birth to an Rh positive baby or of any previous history of transfusions.

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CHEMISTRY

Flame-Resistant Plastic Developed for U. S. Navy

➤ **FLAME-RESISTANCE**, shock-resistance, and easy molding are outstanding properties of a new plastic developed in the laboratories of the General Electric Company for the U. S. Navy. The product can withstand fire without toxic effects during battle action, it is claimed, as well as the concussions and vibrations of battleship broadsides, and has good electrical properties.

Company chemists, working with Dr. Howard W. Haggard of Yale University, found that they could not use any appreciable amount of organic filler in a laminated plastic or molding compound to fit the Navy specifications without obtaining a material that gave off toxic gases likely to be fatal to human beings.

They therefore turned to experimenting with asbestos, glass fiber and other inorganic materials. The new plastic uses asbestos filler, because it provides the high flame-resistance, low toxicity and shock-resistance, and makes a material that is easily molded. Glass is used in another plastic development for the Navy for panel board on ships. It is made by bonding layers of glass cloth together with melamine resin under high pressure.

Science News Letter, March 24, 1945

ZOOLOGY

Earthworms That Glow Like Fireflies Found

➤ **SMALL** earthworms that shine like fireflies are the find reported by Cyrus N. Ray of the Texas Archaeological and Paleontological Society. (*Science*, Mar. 16)

Mr. Ray describes them as "small round, slender, pink earthworms varying from one-half inch to one and one-fourth inches in length and about as large in diameter as the small end of a hardwood toothpick. These earthworms have the same color, general appearance and movements as those of the much larger worms usually known as angle- or earthworms."

He first noticed the worms on a near-frosty night, when a chance scraping of leaf-mold on the ground disclosed small, glowing pellets, which at first he could not identify by casual outdoor examination. Scooping up some of the surface soil and taking it indoors, he discovered that the objects were the small worms, tightly coiled into little balls.

As the worms warmed up to the indoor temperature they apparently lost their power to glow, but regained it when chilled to the 36 degrees Fahrenheit that prevailed outdoors. Touching them with a sensitive fingertip, Mr. Ray believed that they felt warm; but he lacked suitable physical instruments to make an exact measurement of the heat given off.

Science News Letter, March 24, 1945

CHEMISTRY

Safer Manufacture of Smokeless Powder

➤ **SAFER** manufacture of smokeless powder is the objective of processes on which two Hercules Powder Company chemists, Bernhart Troxler and Leon W. Babcock, have taken out three patents, Nos. 2,370,130, 2,370,209 and 2,370,271.

The first two patents cover the use of inert gases, such as nitrogen, helium or carbon dioxide, as an atmosphere in the closed vessels in which all steps of manufacture are carried out. This is to minimize the danger of accidental ignition, always present when atmospheric oxygen is present. The third patent is on a large, bin-like apparatus into which the powder is introduced, after formation into grains, for its final steps of cleaning and drying, which at present involve several separate handlings, with transfers from building to building.

Science News Letter, March 24, 1945

MEDICINE

Oasis for Strep Germs

The Navy's disease fighters win their struggle in the northern Idaho panhandle despite sulfa-defying germs; mass chemoprophylaxis used.

By JANE STAFFORD

► IN THE northern Idaho panhandle there is a streptococcal oasis. Seeing it, you would never call the region an oasis. The olive and date trees traditional to oases for humans in the desert are lacking in this mountainous, forested section of Idaho. But it apparently has what it takes to make an oasis for that dangerous tribe of germs called streptococci. The Indians for generations avoided the region, though they lacked the knowledge to recognize it as an oasis for strep germs. White men did not know it was a streptococcal oasis, either, until the war turned the searchlight of modern medical science on it.

The Navy found out about this oasis when it built a big training station at Farragut. The station was opened in 1942 and within three months the health problem had become terrific.

Disease germs went on a rampage. They kept it up for two years. Mumps and all kinds of pneumonias occurred there more frequently than at other naval centers. The streptococcus family of disease germs gave the worst headache. These germs cause tonsillitis, bronchitis, sinusitis, ear trouble, scarlet fever, occasionally pneumonia and meningitis, and precipitate rheumatic fever and rheumatic heart disease.

Idaho's streptococcal oasis loosed a singularly tough and virulent form of streptococci. Some were the most dangerous we have had in this country since 1918. A man attacked by them would report sick one day with a sore throat. The second day he had streptococcal pneumonia. The third day he had empyema. Recruits came down with this virulent infection within two weeks after reaching the station.

Program Threatened

The oasis lived up to the Indian superstition about it with a vengeance, threatening to wreck the naval training program. The training station at Farragut would have been closed early in 1943 on the advice of naval medical authorities if

there had been any place else to send the recruits needed for expansion of our Navy. But there was no alternative.

So instead of closing the training station in the oasis, it was expanded and recruit training continued until late fall of 1944. The Navy's disease fighters lived up to their slogan of keeping "as many men at as many guns as many days as possible" even if they could not achieve the medical ideal of keeping every man healthy.

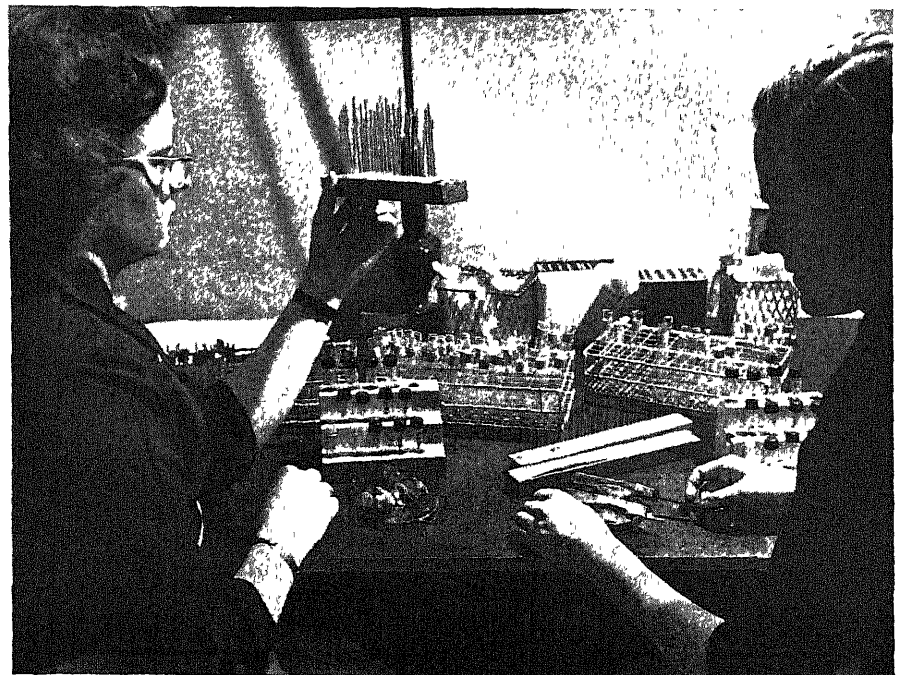
They managed to squeak through to victory over the oasis. The naval training program was saved and we got enough bluejackets to swarm over the Pacific and push the Japs closer and closer to their ultimate defeat.

Sulfadiazine was the weapon that saved the day temporarily at Farragut, holding the fort against the streptococci even though the walls were breached and the streptococcal invasion came dangerously near to being overwhelming. These germs

were a problem not only in Idaho's oasis but at other naval activities elsewhere in the country. The situation everywhere had grown so threatening that in September, 1943, the Surgeon General of the Navy, Vice Admiral Ross T. McIntire, called a conference of medical scientists to explore the entire problem thoroughly. This group decided on the heroic procedure of trying to halt the spread of streptococcal disease by giving small doses of sulfadiazine to every recruit during every day of his training. Mass chemoprophylaxis is the name for the procedure.

At first it was started in only a few naval stations and limited to certain groups of men. This was so the effects could be closely watched and the benefits, if any, carefully measured by comparison with what happened in similar groups not getting the drug.

After three months the results were found so good that the chemoprophylaxis was extended to other naval activities. By June, 1944, 600,000 men had been given continuous sulfadiazine prophylaxis. Only one-tenth as much streptococcal respiratory disease occurred among these men as among 350,000 not getting



TYPING GERMS—Streptococci are being typed at the National Naval Medical Center in this photograph by Fremont Davis, Science Service staff photographer

sulfadiazine prophylaxis, naval medical records showed. Rheumatic fever cases fell off. Meningitis was reduced practically to zero.

Even in Idaho's oasis, the suladiazine prophylaxis started in two camps in December, 1943, took hold. Within the first week sickness in these camps dropped precipitously. The program was extended so that after March 6, 1944, everyone at the station, including civilian employees, was getting daily doses of the sulfa drug.

During the spring months scarlet fever fell off at Farragut, though it was increasing throughout the nation. Strep sore throats, strep pneumonia, and rheumatic fever decreased at the same time.

In May, sulfadiazine programs were stopped at all naval activities. Scarlet fever and other streptococcal diseases usually fall almost to the vanishing point in the summer so it was thought safe to stop chemoprophylaxis. The oasis of Idaho, however, did not follow the rules. During the summer of 1944, as during the summer of 1943, the streptococci continued to be active. Sickness from these germs rose higher than at other naval centers.

Tried Sulfadiazine

The medical officers at Farragut tried sulfadiazine in companies with many streptococcal infections and even increased the dose of sulfadiazine. With three times the dosage that had been effective elsewhere, the streptococcal infections continued during August and September. In the late fall it was possible to stop the arrival of new recruits since facilities had become available in other localities.

Meanwhile the Navy's medical men had been looking into the matter of whether the oasis for streptococci had drug-resistant bacteria. Development of drug resistance in other diseases had been met by medical men before this experience. Sulfa drug treatment has had to be abandoned in certain individuals because of this drug resistance on the part of the disease germs. When this happens, doctors now can turn to penicillin but there may come a day when germs develop resistance to penicillin. The problem is one of far-reaching importance.

The Navy has already developed an important tool for investigating this problem. This is a special culture medium for streptococci to grow on in the laboratory. Heretofore scientists had no way of knowing whether or not a particular strain of streptococcus was sulfa-drug resistant except by what happened when

the drug and the germs met in a patient's body. The reason was that the culture medium contained material that chemically blocked the action of the sulfa drugs. The Navy laboratories at Bethesda, Md., however, developed a medium containing none of these sulfa-drug-inhibiting substances.

With this medium it was found in the

fall of 1944 that nearly all the streptococci at Farragut were sulfadiazine-resistant. The same types of streptococci from other naval centers, however, were not sulfadiazine-resistant. In general, sulfadiazine prophylaxis has proceeded this winter at other naval activities with promising results.

Why streptococci were sulfadiazine-



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Do You Know?

Babbins is a new insecticide produced in Peru to use against cotton plant pests.

Switzerland *watch factories* are working full time, and exports in 1943 were 17% higher than those of the preceding year.

Large quantities of *soap* are used in the wire-making industry to decrease friction as the wire is drawn through dies to reduce it to the desired size.

Diesel engines in various parts of the world are operating satisfactorily on linseed, cottonseed, peanut, tung, palm and camphor oils.

Waterproof *matches*, developed for use in jungle areas and at sea, will light after being submerged in water for many hours.

Forty-watt fluorescent *lamp* recently developed does not require a starter and operates on a special type of instant-starting ballast.

The *stingless bee*, scientifically *Melipona beecheii*, was the one particularly favored in Mexico and Central America; it is sometimes called the "loyal" or "lady" bee.

Foxes and minks are the two principal animals raised on American fur farms, with rabbits rating next; martens, muskrats, raccoons, chinchillas and others are raised in limited numbers.

The total amount of *iodine* found in the average man weighs a little less than a drop of water; about one-half of this essential material is located in the thyroid gland and the rest distributed to every cell in the body.

MATHEMATICS DICTIONARY

Second Printing, Second Edition

American Library Association's Subscription Books (encyclopedias, dictionaries, etc.) Committee says in Subscription Books Bulletin, Oct. 43: "In its subject field there is no work directly comparable to the Mathematics Dictionary. Because of its usefulness to anyone seriously interested in mathematics, the volume is recommended for personal, school or library purchase. For those already possessing the 1942 edition, purchase of the 1943 edition is suggested only if the dictionary is extensively used or a second copy is desired." Send \$3.00 to Digest Press, Department 3B, Van Nuys, California, or Science News Letter.

From Page 187

resistant at Farragut is at present an unanswered question. It has been suggested that the germs developed the resistance as a result of the prophylaxis. The small daily doses, according to this theory, were not enough to knock out the germs but just enough to let them get used to the drug and learn to tolerate it. However, this did not occur at other naval activities where identical prophylactic programs were instituted and the same types of streptococci were present.

There is another striking difference between Farragut and other places: Streptococci at Farragut thrive 365 days of the year instead of following the usual strep life cycle of four months of increasing pathogenicity in the winter, a critical decline and then a long period of quiescence in the summer. Farragut is the only activity in the Navy where streptococcal diseases are prevalent throughout all sea-

sons. It may be, therefore, that conditions in Idaho's panhandle favor bacterial mutation. That may explain not only the sulfadiazine resistance of the streptococci but the region's ancient reputation.

The experience at Farragut provides a warning against the wishful thinking that all you have to do to avoid sore throats, scarlet fever, rheumatic fever, and other streptococcal diseases is to take a sulfa pill every day. Chemoprophylaxis against the streptococci is a valuable adjunct and effective within certain limits but it does have its limitations. Other recognized measures for preventing the spread of streptococci, such as isolating patients even if they have only sore throats, are essential and oiling floors to control dust, ultraviolet irradiation of the air and use of triethylene glycol vapor to sterilize the air may also be called for.

Science News Letter, March 24, 1945

RADIO

New FM Converter

➤ A NEW FM (frequency modulation) converter, built by the Engineering Department of the Federal Communications Commission, will prevent the possibility of \$50,000,000 worth of FM receivers now in use from becoming obsolete. The new converter will enable you to pick up FM broadcasts in the new part of the spectrum to which the FCC proposes to move FM broadcasting.

Patterned along the design of remote-control tuning devices and wireless record players which can be used with a standard broadcast receiver, the FCC converter can be operated from any convenient location in a room with the present receiver. If operated from an armchair, you can tune stations in and out without touching your main receiver, making it a lazyman's remote control.

It was developed by the FCC as a result of protests from FM broadcasters at recent hearings following the publication of FCC proposed frequency allocation.

These broadcasters declared that by moving FM up in the spectrum, the FCC was wiping out thousands of expensive receivers now in the hands of listeners. The FCC has replied by offering this converter, that is capable of converting an FM receiver geared to the present 42-50 megacycle band where FM is now located, so that it can receive the 84-102

megacycle band to which the FCC plans to move FM.

Any radio amateur or handyman can build one of these FM converters, which is about the size of a cigar box, at a total cost of \$8.85 for parts that are now available in radio stores. Commercial ready-built converters will also be available for about \$11. No special knowledge is needed to install one of these converters. The converter in no way affects the fidelity of tone and the quality of reproduction of sound in the FM receiver.

It is believed that FM broadcasters may take steps to make these converters available to their listening audience at cost in the event that FM is shifted.

Science News Letter, March 24, 1945

NUTRITION

Civilians Drinking More Milk Since the War

➤ CIVILIANS have been drinking more milk and eating more meat since the war. They are now drinking between 20% and 25% more milk than they drank in the prewar days, according to the War Food Administration. During the first three months of 1944, the average American was eating meat at the average annual rate of 158 pounds, as compared to 126 pounds each year in the late thirties.

Science News Letter, March 24, 1945



Flowers for Easter

► **LILIES** on thousands of altars, vying with the wax of the candles for whiteness, again proclaim Easter as the day of victory of life over death. They have sprung from dry-looking, seeming-dead bulbs buried in the earth. Whoever plants a bulb, whether he is a Christian believer or not, is engaged in a rite of faith: he "expects the resurrection, and the life to come."

For all their stately waxen beauty, however, the long-throated white lilies are really usurpers in their present primacy as Easter flowers. They are not natural to the season. If you planted any of their bulbs outdoors last fall, they will not be coming up into bloom now along with your jonquils and hyacinths; you will not see their flowers until midsummer. Only by forcing them in greenhouses are florists able to deliver Easter lilies in bloom at Eastertide.

It would really be more in keeping with the traditions of the Easter feast if we should bedeck our churches with the multi-hued early spring flowers that are to be found in bloom in the woods and fields and in our own gardens. That is what our forefathers did, in simpler times before the coming of florists, and commercial greenhouses. Sometimes they were even un-selfconscious enough to make wreaths of fresh flowers and wear them in their own hair.

There is a wealth of early wildflowers that could very appropriately be used for a more natural Easter observance of this kind: violets, hepaticas, spring-beauties, trout-lilies, geraniums, anemones; on trees and shrubs, flowering dogwood, redbud, hawthorn, crabapple—the list might be extended indefinitely. Blossoming time for these various spring species spreads

out over a month or more; but the migrations of the movable feast of Easter, from late March to late April, will always be bracketed by a goodly number of dates on the natural floral calendar. Also, some species that are too late for Easter in the North will be in bloom at just the right time in the South.

There are a few flowers that will have an especial appeal, at least to children and other persons with still-undulled imagination. There is the beautiful amethystine chalice of that prairie anemone that poetic French pioneers named for Easter itself: the pasque flower. It blossoms for the earliest dates of the feast.

For Easter's later occurrences there are several kinds of trillium, the flower that has everything in threes—even its leaves. Appreciative artists have wrought it into ecclesiastical symbols of the Trinity.

Finally (and particularly for children) is that eloquent little preacher who somehow never gets invited into a church: Jack-in-the-pulpit.

Science News Letter, March 24, 1945

METEOROLOGY

Highest Winds in World Encountered Over Tokio

► **FLYING** over Tokio at 30,000 feet or more B-29 Superfortress pilots sometimes encounter winds of 175 to 200 miles an hour, reports Col. Cordes Tiemann, Chief of Special Studies, Army Air Forces Weather Division. A normal wind in winter over Japan at an altitude of 30,000 feet is about 100 miles an hour, he stated.

Weather conditions in Japan are changeable, Col. Tiemann declared, speaking as the guest of Watson Davis, director of Science Service, on the CBS program "Adventures in Science." In summer the weather may be as foggy as the Newfoundland Coast, and winter weather in Japan is often like that in our own Chicago.

With weather stations dotted all over the Pacific and on all land areas surrounding the Pacific, the Army Air Forces Weather Division predicts weather in an area of 16 million square miles, equal to five times the area of the United States. These weather stations pass their reports along to a weather central where the information is pooled and a complete over-all weather forecast made.

Weathermen of the AAF work closely with commanding officers of combat groups throughout the Pacific, supplying

them with the forecasts, upon which are based decisions to carry out aerial and invasion operations against the enemy, Col. Tiemann revealed.

Science News Letter, March 24, 1945

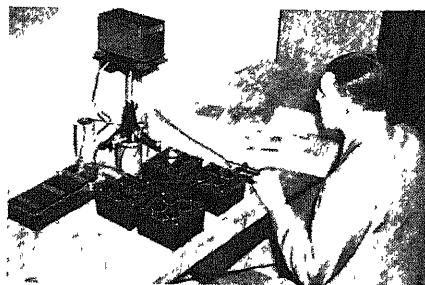
GENERAL SCIENCE

Cresson Gold Medals Go to Admiral and Engineer

► **ELLIOTT** Cresson Gold medals have been awarded for 1945 by the Franklin Institute to Rear Admiral Stanford Caldwell Hooper, USN retired, for his accomplishments in radio for the U. S. Navy, and to Prof. Lewis F. Moody of Princeton University for the leading part taken by him in the design and development of hydraulic turbines and pumps. The presentation will be made on April 18, at the annual Franklin Institute medal day ceremonies.

Cresson medals have been awarded since 1848, with Madame Curie, Rudolf Diesel, Nikola Tesla, Timus Olsen and Roger Adams among the recipients.

Science News Letter, March 24, 1945



RESISTANCE BOXES FOR MANY USES

Those small, inexpensive Resistance Boxes, shown above in a Kelvin Bridge network, are suitable for commercial-power frequency, a-c as well as d-c. They are made in seven sizes; three 2-dial boxes having total resistance of 99,990 and 9900 ohms resp; two 3-dial boxes of 999 and 9990 ohms re-p; two 4-dial boxes of 9999 and 999.9 ohms resp. Prices range from \$21.00 to \$35.00.

The Standard Resistor used is our Reichsanstalt type, made in 3 values; 0.1 ohm at \$50.00, 0.01 ohm at \$55.00 and 0.001 ohm at \$120.00.

The Galvanometer employed is our No. 2420 Enclosed Lamp and Scale, popular for measurements of moderately high sensitivity. Its price is \$40.00.

All these instruments are described in our Publication "Modern Precision", Vol. 4, No. 1.



BIOLOGY

New Science Developed

"Tropicalization" has been developed to combat the fungi that ruin military equipment in steaming jungle regions.

➤ AMONG the most deadly enemies our armed forces in the Pacific have to face are fungi, microscopic lower plants that thrive on heat and dampness. The battle against these enemies, carried on at headquarters of the Air Technical Service Command at Wright Field, Ohio, and by Wilfred F. Horner and Helen Conlon, biologists of the Belmont Radio Corporation, has added immeasurably to the furtherance of the war effort and will continue to benefit persons in tropical regions after the war is over.

Extreme difficulties have been encountered in Pacific and other combat areas, due to effects of tropical deterioration of electronic equipment, including radar radio communication and other devices. This menace was so severe that new methods of moisture and fungus control were necessary in order that the progress of the armed forces may not be impeded.

Laboratory research and field investigations, based upon experience in certain regions such as Florida, and the Gulf and Pacific coasts, have resulted in a new branch of applied science called tropicalization. This science undertakes to prevent failure of equipment due to moisture and fungus growth. Tropicalization can increase the life of equipment over 100 times.

Fungi that attack electronic equipment are molds which obtain their nutrition from deposits of organic dust that collect during handling. These molds produce organic acids, such as citric acid or oxalic acid. They grow best in a relative humid-

ity above 70% and in temperatures above 86 degrees Fahrenheit.

In addition to attacking electrical equipment, some of these molds are parasitic on the human body. For example, a species of *Aspergillus* grows on radar equipment and also grows in the human ear. The number of species for each genus of fungus is astonishing. There are, for example, 36 species of *Aspergillus* and over 600 species of *Penicillium*.

Some of the fungi that develop in the field equipment in the tropics are introduced in the United States at the time of assembly but do not develop until the temperature and humidity are increased. The extent of damage to electronic equipment varies with the type of equipment and the conditions under which it operates. Such units and materials as condensers, resistors, transformers, volume controls, various types of plastics, glass oils, waxes, paints, papers, leather, felt glues and rubber support nu-

merous fungus growths. Eight species of tropical fungi were isolated from a growth on a pair of eyeglasses.

Fungicides in the form of fine liquid sprays, coatings and paints, as well as the vacuum impregnation of parts with waxes, lacquers and varnishes containing fungicides, have been developed to combat the menace. Among the fungicides that have given favorable results are *pentachlorophenol* and *salicylanilide*, in concentrations of 10% or 15% on the basis of solids content. The fungicides that have been tested are developed to protect against moisture and fungus growth without altering the basic features of materials such as electrical properties, tensile strength and so on.

Water repellents and drying agents are also used in packaging, to prevent the introduction of excess moisture in transit.

Science News Letter, March 24, 1945

Some *nemertean*s, commonly called sea-ribbon worms, may shorten their bodies to one-tenth the ordinary length.

The *Hawaiian goose*, or *nene* as it is known to natives, has feet less fully webbed than most geese and has become more of a land bird than water bird; it now lives on the slopes of the great extinct volcano Mauna Kea.

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Books of the Week

➤ **PLASTICS**, from the discovery of nitrocellulose in 1864 up to and including new developments resulting from the second World War, are discussed in **PLASTICS, SCIENTIFIC AND TECHNOLOGICAL** by H. Ronald Fleck (*Chemical Pub. Co.*, \$6.50). Not intended to glamorize an industry which the author believes is already over-advertised, it is more a textbook of the science of plastics.

Science News Letter, March 24, 1945

➤ **ONE** of the most exciting stories in modern medicine, the story of penicillin, loses none of its excitement or drama in this up-to-the-minute account by J. D. Ratcliff, **YELLOW MAGIC** (*Random House*, \$2).

Science News Letter, March 24, 1945

➤ **JUST THE GIFT** for your doctor is **POET PHYSICIANS, AN ANTHOLOGY OF MEDICAL POETRY WRITTEN BY PHYSICIANS**, compiled by Mary Lou McDonough (*Thomas*, \$5). It is one of those books, however, which if you dip into it before wrapping and giving you will find yourself wanting to keep and read. Some of the selections, as Mrs. McDonough points out, hardly rate as poetry, but all are interesting for the glimpses they give of the doctor's thoughts and feelings, usually well concealed behind a detached, professional manner.

Science News Letter, March 24, 1945

Just Off the Press

CARE AND USE OF HAND TOOLS—Raymond R. Toliver—*Wiley*, 93 p., illus., \$1.25.

CAREERS IN THE STEEL INDUSTRY—Burr W. Leyson—*Dutton*, 191 p., illus., \$2.50.

THE DRAINAGE OF AIRPORTS—W. W. Horner—*Univ. of Ill.*, 48 p., paper, illus., 50c (Eng'g Experiment Station Circular Series No. 49).

EGG COOKERY, a Complete Handbook of Tested Recipes for Breakfast, Luncheon and Dinner—Lily Haxworth Wallace—*Barrows*, 169 p., \$2.

HEAT EMISSION AND FRICTION HEADS OF HOT WATER RADIATORS AND CONVECTORS—Frederick E. Giesecke and Alonzo P. Kratz—*Univ. of Ill.*, 52 p., paper, illus., 50c, (Eng'g Experiment Station Bull. Series no. 356).

I KNEW YOUR SOLDIER, an Intimate Picture of Our Boys Overseas, by the Red Cross Girls Who Know the GI Best—Eleanor "Bumpy" Stevenson and Pete Martin—*Infantry Journal*, 237 p., paper, 25c.

IMPACT ON RAILWAY BRIDGES—Charles T. G. Looney—*Univ. of Ill.*, 128 p., paper, illus., \$1., (Eng'g Experiment Station Bull. Series no. 352).

INTRODUCTORY GENERAL CHEMISTRY—Stuart R. Brinkley—*Macmillan*, 645 p., illus., \$4., 3rd ed.

PHOTOGRAPHIC SURVEYING—B. B. Talley and Paul H. Robbins—*Pitman*, 223 p., illus., \$3.

SOCIAL WORK YEAR BOOK, 1945, a Description of Organized Activities in Social Work

and in Related Fields—Russell H. Kurtz, ed. *Russell Sage*, 620 p., \$3.25. Part I. An authoritative record of organized activities Part II. A directory of 472 national agencies in social work and related fields.

SPLICING WIRE AND FIBER ROPE—Raoul Graumont and John Hensel—*Cornell Magazine*, 114 p., illus., \$2.

THE VISCOSITY OF GASES AT HIGH PRESSURES—Edward W. Comings and others—*Univ. of Ill.*, 68 p., paper, illus., 75c, (Eng'g Experiment Station Bull. Series no. 354).

YELLOW MAGIC, THE STORY OF PENICILLIN—J. D. Ratcliff—*Random House*, 173 p., illus., \$2.

Science News Letter, March 24, 1945

NUTRITION

Spring Meals May Be Low In Vitamin C Content

➤ **UNLESS** the housewife guards against it, the family's meals in late winter and early spring may be skimpy in the amount of vitamin C they provide. The reason, according to a report from the U. S. Department of Agriculture, is that many vegetables and fruits lose some of their vitamin C content during winter storage. Tests at many state agricultural experiment stations have showed a gradual loss of vitamin C in potatoes, apples, onions, cabbage, parsnips and even in some canned fruits and vegetables during the months in storage.

Many of these foods are not individu-

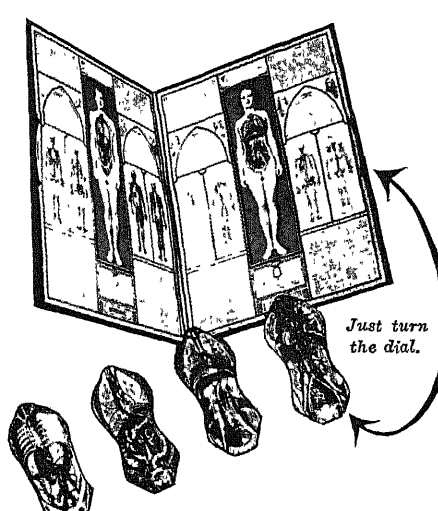
ally rich in vitamin C but each adds its bit to the daily total in the diet. C is the vitamin needed for protection against scurvy. In order to make sure early spring meals are not short in this vitamin, the Department of Agriculture scientists advise eating more of the foods that are especially rich in this vitamin, such as citrus fruits, tomatoes, fresh green cabbage and other fresh greens.

Strawberries, already coming on the market in some regions, are another good source of this vitamin. A grown person can get his vitamin C requirement for the day by eating 30 strawberries, the *Journal of the American Medical Association* has stated.

Milk contains vitamin C in appreciable amounts. One quart would supply almost half of the minimum amount of vitamin C required for the day and somewhere between a fifth and a fourth of the recommended daily allowances, the editor of *Nutrition Reviews* calculated. These round numbers apply to pasteurized milk. Raw milk has an even higher content of vitamin C, but it is also likely to have a very much higher content of dangerous disease germs, so one should stick to pasteurized milk, even at some sacrifice of the vitamin C content.

Science News Letter, March 24, 1945

The common American *snapper turtle* has no teeth but it has powerful jaws with knifelike edges, and it can thrust its jaws out with the speed of a boxer's flying fist.



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☼ **ELECTRONIC** glassware, such as electric toasters, waffle irons, and other cooking utensils that can be put directly on flame, will be made after the war by a new process of molding glass with high-frequency electric current. The glassware is now used in wartime radio, radar, and other electrical instruments.

Science News Letter, March 24, 1945

☼ **EGG-SHELL** strength is tested by placing 25 eggs, small end downward, in separate compartments in a tray with four supporting casters. The tray is then permitted to run down an inclined plane fixed on a table, hitting a block at the bottom. Shells below standard strength are cracked but not broken.

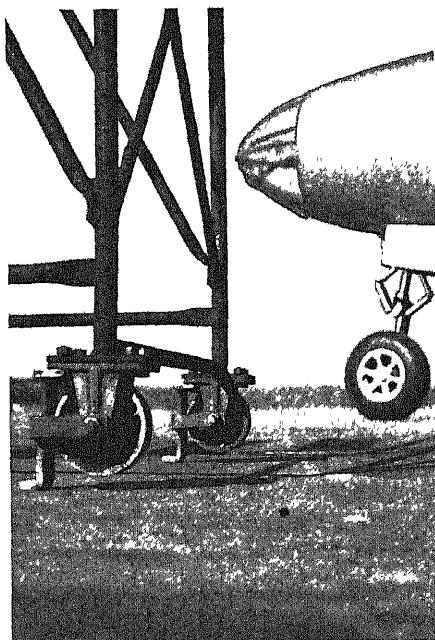
Science News Letter, March 24, 1945

☼ **LIQUID LEVEL** gauge for motorcycle tanks has three glass rods of different lengths extending downward into the tank with pointed ends angled at 45 degrees. Light passing down the rod passes into the gasoline when an end is immersed; otherwise it is reflected back through the rod, brightening its visible upper end.

Science News Letter, March 24, 1945

☼ **DE-SCALING** tubes for marine and other uses involving exposure to salt water, employ the thermostat principle. Oval in cross section, the bi-metal tubing has a strip of metal of a lower expansion coefficient silver-bronzed along its length which causes the tube to bow and straighten with changing temperatures, thus cracking off the scale.

Science News Letter, March 24, 1945



☼ **SAFETY LADDER** for mechanics working on planes on airfields can not "creep" when fitted with metal brackets behind the wheels on its front support, as shown in the picture. When the ladder is tipped forward to be moved to a new position the wheels come in contact with the ground.

Science News Letter, March 24, 1945

☼ **EYE AND NOSE** protector for boxers and football players has an open frame of a strong but resilient metal fastened to a head band of leather or to the football helmet. The frame presses against

the forehead and the bridge of the nose, and has a leather apron to cover the nose. Lenses may be attached if desired.

Science News Letter, March 24, 1945

☼ **ALUMINUM DRUMS**, especially developed for the Army to carry aviation fuel by air, hold 55 gallons of gasoline but weigh 31 pounds less than steel drums of the same capacity. Their use decreases the total weight of a loaded plane considerably, and assisted greatly getting fuel to American planes in China.

Science News Letter, March 24, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 251.

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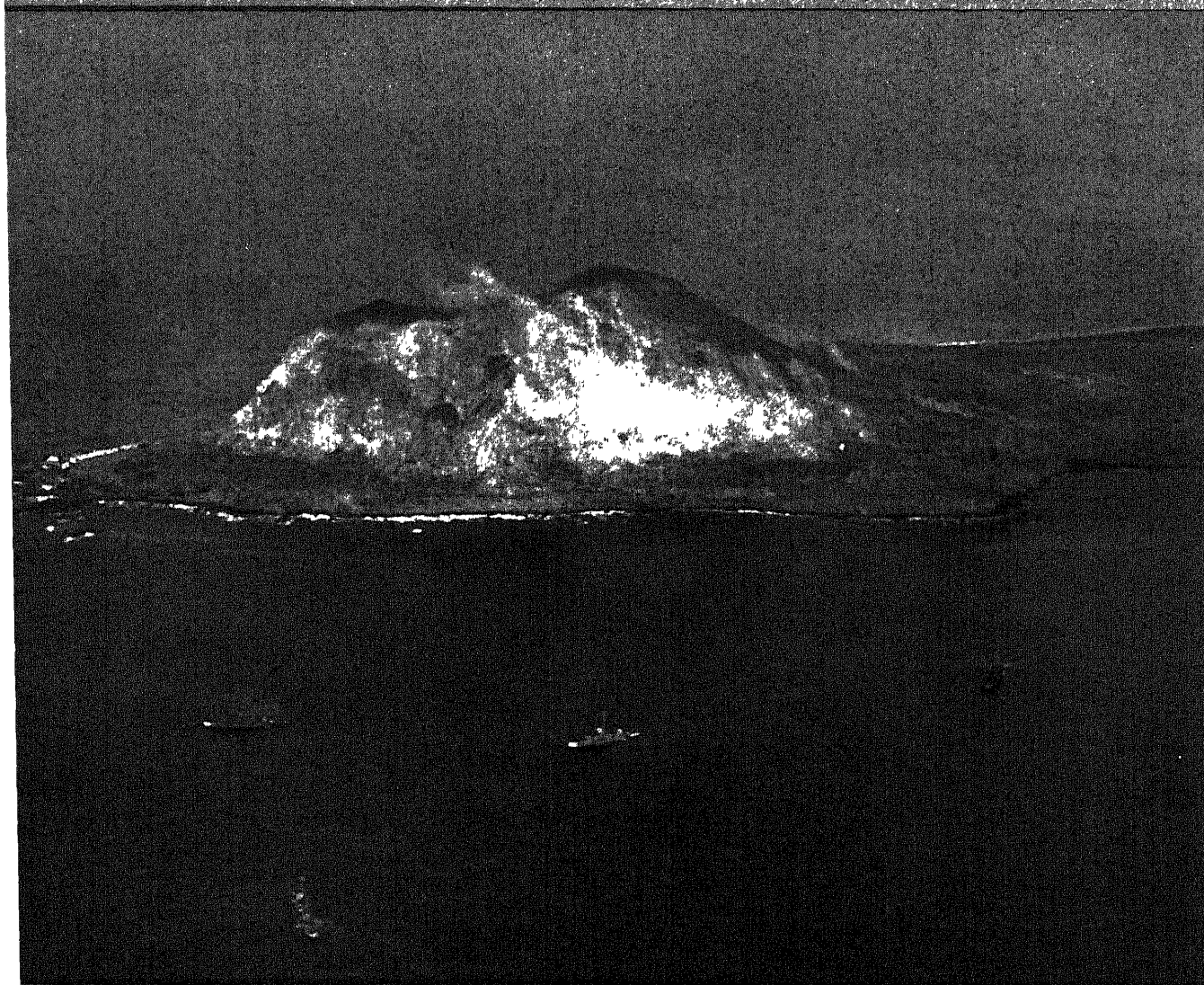


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SCIENCE NEWS LETTER



THE WEEKLY SUMMARY OF CURRENT SCIENCE • MARCH 31, 1945



Iwo Jima
See Page 195

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CHEMISTRY

Resins Purify Water

Sugar solutions, chemicals and pharmaceutical products are freed of inorganic salts by passing through ion-exchange synthetics.

➤ WATER is now freed of undesirable mineral salts by filtration through specially-prepared synthetic resins and purified to a degree where it is nearly equivalent to distilled water in quality, and may be used in place of distilled water in many chemical processes, declared Dr. Robert J. Myers, of the Resinous Products and Chemical Company, Philadelphia, in a lecture at Western Reserve University. Sugar solutions, chemicals, and pharmaceutical products may be purified of inorganic salts by the same method, he said.

This modern method of producing water and chemical solutions free of inorganic salts consists in passing them through two beds of the special resins known as ion-exchange resins. The ion-exchange synthetic resins are of two kinds, he explained, a cation-exchanging type and an anion-exchanging type. The first will exchange sodium for calcium and magnesium ions, the latter two being the hardness-producing ions in water supplies, and the water is thereby softened. When the store of sodium ions in the resins is exhausted, the calcium and magnesium ions which have been captured by the resin during the softening process are flushed off by the use of strong salt solutions and the rejuvenated resin is again ready for use.

"In a similar manner the same resins can be used as a storehouse of hydrogen ions," the speaker continued, "by treatment of the resin with a mineral acid, and the hardness-producing as well as the alkali-ions of water may be displaced by hydrogen ions."

Sodium bicarbonate alkalinity is converted to carbonic acid, and mineral salts, such as sodium sulfate, are converted to the free acids by the use of the hydrogen exchanger.

"The anion-exchanger resin is a similar gel-like substance which contains basic groups, such as amino, which bind mineral acids when placed into contact with acid solutions," Dr. Myers explained. "When the effluent from a hydrogen exchanger bed is passed through a bed of granulated, anion-exchanger resin, the free mineral acids generated in the first bed are bound by the second bed, and

water free of all mineral salts emerges from the second bed."

Such "de-ionized" water is nearly equivalent to distilled water in quality and can be produced at a fraction of the cost, he added.

Water, de-ionized by this process, is being used in the manufacture of synthetic rubber, pharmaceuticals, plastics in ceramics and metallurgy, he stated. Specific processes for the removal of dissolved salts from molasses, formaldehyde solutions, and sugar syrups, and other purposes, have been developed. Organic chemical synthesis, Dr. Myers said, has been combined with colloid chemistry in the development of the synthetic resin exchange adsorbents.

Science News Letter, March 31, 1945

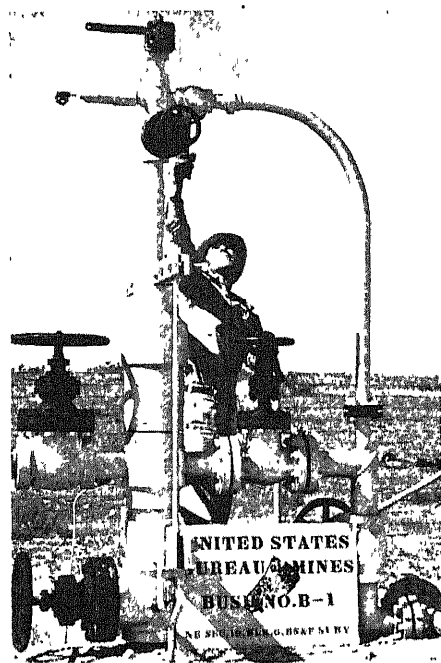
CHEMISTRY

Color Detectives Speed Chemical Analysis

➤ COLOR detectives that simplify and speed up the chemical analysis of such substances as milk, metals, beer, wine and soap have been perfected in stable form at the University of Illinois. The detectives are chemical reagents that have long been known in chemical laboratories, but because of difficulties involved in compounding them have not heretofore been looked upon as stable and positive tools of chemical analysis.

Chemically the reagents are known as ortho-phenanthrolines. They are so efficient that they are able to disclose the presence of one part of iron, or certain other elements, in a million parts of water. The new development at the university chemical laboratory is a process of producing the reagents as stable compounds capable of giving reliable reaction. Their use will permit an industrial chemist to make in 15 minutes a certain analysis that under old methods might take a half day.

Phenanthrolines have the property of combining with electrically charged atoms known as ions. Their affinity for metallic ions is so great, according to G. Frederick Smith of the University chemical staff, that three molecules of one of these compounds will combine with one



TRANSPORT LINE—From this typical well thousands of cubic feet of natural gas bearing helium have been removed for processing at the Amarillo plant. Completion of the 32-mile line from Exell, Texas, opens the way for utilizing the Cliffside field as a natural reservoir for storing helium not required immediately by the military and government agencies or by commercial and scientific users.

ion of iron, producing an intensely red water-soluble compound.

The reagent also has an affinity for copper, nickel, chromium, cobalt, zinc and other metals, and with it the presence of these metals in water, or in alloys, or in food products, can be detected.

Science News Letter, March 31, 1945

AERONAUTICS

Engine and Propeller Mounted Separately

➤ A NOVEL way of mounting airplane engine and propeller units is covered by patent 2,371,872, granted to Frank W. Caldwell and Erle Martin of West Hartford, Conn. By mounting engine and propeller separately, each in its own housing, and connecting them with a flexible shaft, two advantages are gained. Most of the troublesome vibration that occurs when engine and propeller are rigidly connected is eliminated; and it becomes possible to remove either engine or propeller for repairs or replacement without disturbing the other.

Science News Letter, March 31, 1945

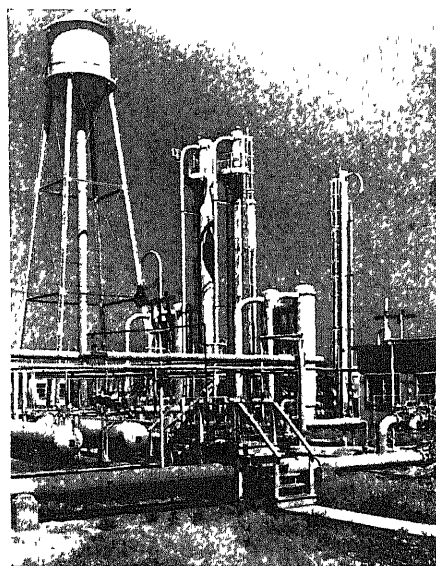
PHOTOGRAPHY

8,000 Pictures a Second

New high-speed motion picture cameras help engineers to see the rapid, complicated movements of their machines "magnified" in slow motion.

► NEW HIGH-SPEED motion picture cameras that will take as many as 8,000 pictures in one second help engineers to see the rapid, complicated movements of their machines "magnified" in slow motion, reported Dr. H. J. Smith, of Bell Telephone Laboratories, at a meeting of the American Society of Mechanical Engineers.

Three new high-speed cameras, developed by Western Electric, use a method of optical compensation to take their pictures. They differ mainly in that they are built to employ different widths of film. The eight-millimeter camera takes 8,000 pictures in one second. The film is the same as used in "double-eight" home movie cameras, Mr. Smith pointed out.



HELIUM EXTRACTION—This imposing array of pipes and towers at the carbon dioxide removal plant represents an important phase at the Bureau of Mines helium plant at Exell, Texas. The plant is the point of origin for a new 2-inch line which permits direct pipe line transportation of helium to the Bureau's Amarillo, Texas, extraction plant or to the Cliff-side natural gas field where an underground helium "warehouse" has been established. (See SNL Mar. 17.)

The exposure time for these pictures is 33 microseconds, and when projected in a standard eight-millimeter movie projector, the pictures are slowed down in the ratio 500 to 1. (A microsecond is a thousandth of a second.)

The 16-millimeter camera, Dr. Smith stated, takes up to 4,000 pictures per second, each picture receiving an exposure of about 83 microseconds. The camera weighs only 35 pounds. By the simple expedient of photographing the action at 4,000 pictures a second, and projecting the pictures at 16 pictures a second on any standard projector, the action that was photographed will be retarded or "magnified" by the ratio of these two speeds, or 250 to 1.

Just recently the Bell Telephone Laboratories has developed a wide angle, 35-millimeter high-speed camera that will take up to 3,500 pictures a second on professional size movie film. Designed primarily for high speed studies encountered in aeronautical and ballistic research, the camera takes a picture with a field of view up to an angle of 40 degrees. This is equal to a 71-foot field of view at a distance from subject to camera of only 100 feet, Dr. Smith declared.

The optical compensation method of high speed photography used in these three cameras, which are sold under the trade name "Fastax," uses a rotating compensating glass prism placed between the lens and the film in the camera, Dr. Smith explained. In the 16 millimeter camera the prism is shaped like a cube, having two pairs of parallel glass faces. This prism is placed inside a housing having four apertures which rotates around the prism. This acts like a barrel-type shutter. The film moves continuously past the picture aperture and four pictures are exposed during each revolution of the prism. The exposure time is controlled by the speed of rotation of the prism housing.

The eight-millimeter camera employs an octagonal shaped prism, having four pairs of faces. The 35-millimeter camera employs a four-faced prism like that used in the 16-millimeter camera, Dr. Smith stated.

The high speed camera used to make slow motion pictures of prizefights, athletic events and horse races seldom run above 128 pictures a second, Dr. Smith advised.

Lighting the subject must be given careful consideration when taking high-speed pictures, Dr. Smith pointed out. Generally speaking, the amount of light required will be in direct proportion to the speed with which the pictures are taken. Thus, about 500 times as much light is needed to take pictures at 8,000 a second as at 16 a second. With a camera operating at 1,000 pictures a second, photo-flood lamps may be used. Pictures can also be taken outdoors in bright sunlight at this speed.

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MILITARY SCIENCE

Navy Task Force Lands Fifth Amphibious Corps

See Front Cover

► LAUNCHING the Marines in the grimmest battle in a long history of grim battles, ships of a giant Navy Task Force land members of the Fifth Amphibious Corps on Iwo Jima on Feb. 19, as shown in the U. S. Navy photograph on the front cover of this SCIENCE NEWS LETTER.

The pattern is historic; following an obliterating aerial and surface bombardment Marines swarm ashore—to find the Japs have emerged from their well-nigh invulnerable pillboxes and caves to put up a fanatic defense. Battle smoke blurs Navy ships and their targets ashore as the Task Force supports the landing with seaborne artillery.

Science News Letter, March 31, 1945

CHEMISTRY

Continuous-Flow Process For Alcohol Production

► A CUBAN inventor, Francisco Alzola of Havana, has received patent 2,371,208 on a continuous-flow process for the production of industrial alcohol, with which he proposes to replace the traditional batch process. His apparatus consists of a series of vats or tanks, into the first of which he introduces the mash of molasses or other carbohydrate, together with the necessary yeast. As fermentation proceeds, the working mash is passed from vat to vat, until maximum alcohol concentration is reached in the last one, when it is withdrawn for distillation.

Science News Letter, March 31, 1945

ELECTRONICS

Radar for Safety

Experimentation is aimed at the perfection of two devices, one for airport use, and the other, a collision warning device, for use in the plane itself.

➤ RADAR will help to make postwar air travel even more safe as the result of research started by the Civil Aeronautics Administration, which is expected to increase the safety factors of flying in fog, snow, rain or when the ground is obscured by clouds, called "instrument weather" by pilots.

Experimentation now under way at the CAA Experimental Station at Indianapolis is aimed at the perfection of two radar devices, one for airport use, and the other, a collision warning device, for use in the airplane itself. About 10 carloads of radar equipment has been loaned to the CAA for this research.

A radar tower controller for airports will permit the control tower operators to visualize on a screen the actual positions of all aircraft within a radius of about 25 miles. This would detect immediately any hazardous condition that might occur because of pilot's error, or some mechanical failure in the radio landing system. The operator could adjust the control of outbound traffic at a fogbound airfield with complete knowledge of the exact position of all incoming planes. Today, the only way an operator can determine the position of planes near his field is through position reports which are radioed in by pilots. Only one of these pilots' reports can be handled at a time, and the estimates are not always accurate.

The collision warning device is designed to be mounted on the instrument panel of the airplane. Not just another gadget to clutter up the already jammed instrument boards in most planes, the radar screen will be extremely valuable. It will report to the pilot his position in the air relative to other aircraft, and to obstacles in his path, such as radio towers, beacons, water towers and similar objects that may be hidden from his sight when the ceiling is low.

In actual operation of the collision radar instrument, pilots would be responsible for maintaining the proper distance from other aircraft while climbing to assigned altitudes, and while approaching an airport for a landing. The complete landing approach could be handled by the pilot with the control tower acting

as a monitoring agent through its radar screen. This would speed up landings and take-offs in bad weather.

A radar collision warning device was developed several years ago by the CAA, but it was too heavy and too expensive for general use. Wartime demands have speeded up the refinement and practical application of this device.

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AERONAUTICS

Auxiliary Wing Tanks Carry Men, Medicine

➤ HOBOES who believed their traveling was forever limited to bumming rides on the undercarriages of freight trains have a chance to hitch-hike through the sky in cargo cocoons slung under the wings of Army Air Force fighter planes, it appears from a report in the magazine, *Air Force*, (March).

Although they look like giant-size cocoons mounted under the wings of a P-38 Lightning fighter plane, they are actually auxiliary wing tanks specially fitted to carry human beings comfortably, or medicines, repair parts, ammunition and supplies. In the Pacific and China-Burma-India theaters wounded men have been carried to rear bases in makeshift tanks of a similar type. Each tank has an 1,800-pound capacity.

When men are to be carried, the tanks are modified by inserting a mattress for comfort, a clear plastic nose and a tail cone which can be jettisoned so the occupant can get out in an emergency and easily parachute to earth. An intercommunications system links the pilot of the fighter with his passengers under each wing.

To prove the reliability of carrying personnel, Chief Warrant Officer George L. Singleton emerged from a wing tank cocoon at 7,000 feet while the plane was flying at 170 miles an hour and parachuted to earth.

Enough supplies can be carried to fly operational missions lasting several weeks. Each cocoon tank will hold enough mechanical supplies for minor repairs of an entire squadron of planes for five days plus enough ammunition

for more than three days as well as four extra machine guns and enough food rations for 24 men for three and a half days.

Science News Letter, March 31, 1945

Asbestos, used extensively in the United States, is obtained principally from Canada, although some is mined in this country and some is obtained from Africa, India, Australia and Russia.

Two pounds of flaked *calcium chloride* added to a bag of cement used in making concrete gives a mixture that is risk-free from freezing and permits concrete construction during cold weather.

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ELECTRONICS

Bombers Get Gadgets

Brushes for electrical generators permit the B-17's to fly indefinitely at altitudes above 30,000 feet, where previously they lasted a few hours.

► THE SUCCESS of our Flying Fortresses and Superfortresses is due in large part to the new electrical gadgets that help them to fly, bomb, fight and live to fight another day. One of these developments provides brushes for electrical generators, permitting the B-17's to fly indefinitely at altitudes above 30,000 feet. Before the development of these brushes, the generators were not expected to last more than two to three hours at such altitudes.

In the development of the new generator brushes, and other devices, a young civilian engineer, George W. Sherman III, chief of the Direct Power Unit, and Col. Ted Holliday, chief of the Electrical Branch, have played an important part at the Equipment Laboratory of the Air Technical Service Command, where the work has been carried on.

Every pound that an engineer can save in equipment aboard a plane means that one more pound of military punch can be added in bombs and bullets, since weight is a factor of prime importance aboard airplanes. Through careful design, these engineers have built electrical generators for the B-29 that save 300 pounds of weight. A 50-caliber cartridge weighs four ounces, so that 300 pounds saved means 1,200 additional rounds for the gunners. At the same time these electrical generators have been increased in power over those in the first B-17 by 1,200%, with only a 50% increase in weight and almost no increase in size. There are six low-voltage direct current generators on every B-29; each delivers 54 kilowatts, which is about 70 horsepower. By comparison, you run your refrigerator on one-sixth horsepower and your radio on one-seventh horsepower.

In today's big bombers electrical systems perform literally hundreds of jobs. The B-17 contains 11 miles of wiring; and the B-29 has about 75,000 feet of wire strung throughout the fuselage and in equipment. There are about 150 electrical motors in a Superfortress.

In a combat mission aboard a big bomber, this is what electricity does: It starts the engines, changes the propeller pitch, raises and lowers the landing gear,

opens and closes the bomb bay doors, manipulates the flaps and brakes, runs the bombsights, releases the bombs, turns the gun turrets, computes the gunners' sights, fires the guns, by radar waves detects and identifies ground units, and provides light and heat for the air crewmen.

The huge airplanes of the not too distant future are still military secrets, but some idea of their size can be gained from the statement of Mr. Sherman, "They will be plenty large, in view of the fact that we have to increase the 30-volt direct current system to 120 volts in order to meet the electrical demands of the new aerial battleships."

To go along with the complicated B-29 electrical system, an electrical repair shop has been developed which is now being used in India and on Saipan to maintain the Superfortresses striking at Tokio. One of the problems confronting repairmen

is the fact that electrical motor armatures grow beards of fungus in tropical areas. In addition to equipment for the repair and testing of all electrical units on the B-29's, repairmen now receive instructions on how to prevent the growth of fungus on vital equipment parts through the use of special anti-fungus powders and sprays.

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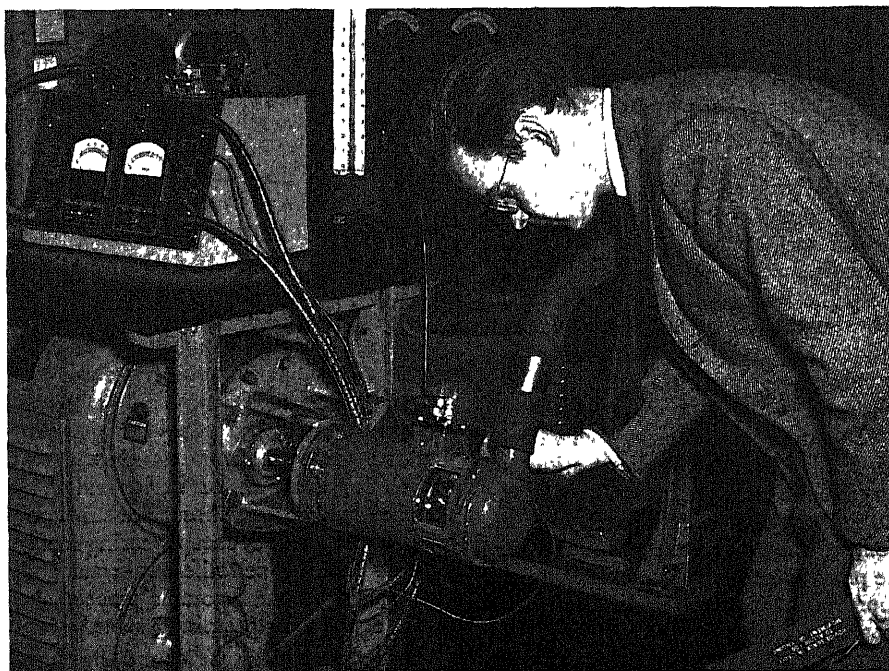
METALLURGY

Magnetic Separation of Pure Iron Particles

► A HARVARD faculty member, Prof. John Wulff, offers a method for magnetic separation of pure iron particles from those containing carbon, as subject of patent 2,371,665. Purest possible iron is needed in powder metallurgy; too high a carbon content interferes with proper sintering.

Prof. Wulff's process depends on the fact that at a certain critical temperature carbon-containing iron becomes much less magnetic than pure iron. Heated to this temperature, the finely powdered iron is flowed over a magnetic separator. The pure iron particles stick, while the carbon-contaminated ones fall off.

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NEW GENERATOR—The secret of its ability to continue operating at extreme altitudes lies in the efficient brush design. George W. Sherman, who spent more than 50 hours flying at high altitudes working on the problem of developing long-wearing generator brushes, is shown examining the modern high flying aircraft generator.

PUBLIC HEALTH

Medical Care for Veterans

The Senate subcommittee urges extension of present facilities so returning servicemen and their families will not lack adequate care.

➤ EXPANSION and development of present community health and medical facilities so that the 15,000,000 returning veterans of this war and their families will not lack adequate care is recommended by the Senate subcommittee on wartime health and education in an interim report released recently.

Members of the subcommittee are Senators Claude Pepper, Fla., chairman, James M. Tunnell, Del., Elbert D. Thomas, Utah, Robert M. LaFollette, Jr., Wis., and H. Alexander Smith, New Jersey.

Because the quality of service given by the Veterans' Administration has been criticized, the subcommittee "proposes to ascertain the facts" through a study to be made at once with the help of medical authorities, veterans' organizations and professional groups.

"The least we can do for the battle-scarred veteran is to assure him any medical care he may need," the report declares.

Even with the planned expansion of the Veterans' Administration facilities to 300,000 beds ultimately, the Administration will not be able to assure adequate medical care in its own facilities for the 13,000,000 or more veterans who will not have injuries sustained in the service and for their families.

"The problem must be dealt with as part of the larger problem of assuring adequate medical care in every community," the subcommittee states.

In the postwar period, veterans of this and previous wars plus their families will comprise one-third to one-half of our whole population, the report points out.

"Therefore the concern which we have for medical care of veterans arises not only from an obligation to protect the future welfare of our fighting men and women," the report states, "but also from the practical necessity of maintaining and improving the health of the whole people."

The report recommends that any veteran who has a service-connected disability should be assured hospitalization and out-patient treatment, not only for his service-connected disability, but also for any other disability from which he may suffer. There is no such assurance

in the present law. Responsibility for full medical care of veterans having any disabilities connected with service should be given to the Veterans' Administration, the report states, adding that such veterans will probably number from 1,500,000 to 2,500,000, depending upon how long the war lasts.

"It should be made clear," the report states, "that the subcommittee does not advocate any restriction on the responsibility which the Congress has placed on Veterans' Administration, nor on

medical services now assured to veterans. On the contrary, it believes that the responsibility of the Veterans' Administration should include full care of all having service-connected disabilities.

"It believes also that the Administration should continue to have the authority which it now possesses to admit for hospital care any veteran in need of such care, when facilities are available and when he is unable to pay for hospitalization. This provision is a necessary safeguard because of inadequate community facilities at the present time, although it can never be a satisfactory alternative to community hospital programs for all veterans."

Special emphasis is given in the report to the need for developing psychiatric services for veterans who do not require hospitalization for mental conditions.

Science News Letter, March 31, 1945

GEOLOGY

Abundant Gasoline Supply

➤ THE UNITED States has a potential source for an abundant supply of gasoline for its future industrial development, declares F. B. Plummer, University of Texas geologist, (*Mining and Metallurgy*, Feb.). This source includes the securing of new petroleum reserves here and abroad, and the manufacture of gasoline from coal, lignite, shale and natural gas.

As for new oil developments, Mr. Plummer mentions that the West Edmond pool in Oklahoma and the expansion of new discoveries in southern Mississippi during the past year signify that large supplies are still to be found in the United States.

"The difficulty of locating pools like the East Texas pool and West Edmond pool in Oklahoma by ordinary geological or geophysical work," he says, "suggests that more intensive subsurface engineering and geological work is necessary—a search for every major buried ridge, a detailed study of the subsurface stratigraphy, development of cheaper coring methods for locating petroliferous strata and courage to test the favorable pinched out sands at the most promising spots."

Large pools may be found by such methods in foreign countries, he states, where up to now geological and geophysical work has concentrated on the location of anticlines and domes and few attempts have been made to locate pools of the East Texas type.

"Undoubtedly, many stratigraphic traps adjacent to the larger oceanic islands, the Philippines, the Netherlands Indies, and the West Indies are filled with oil," Mr. Plummer points out. "Some of these chains of islands are simply ridges partly buried beneath overlapping sediments of the present seas. The subsurface strata contain rich source beds and probably oil pools exist along their borders."

In discussing the possibilities of developing fuel from oil shale, coal, lignite, and agricultural and forestry products, Mr. Plummer says that oil shale is known to occur in quantity in 18 states and contains some 90,000,000,000 barrels of recoverable oil. Oil is now being obtained from shale in Scotland, Germany, Russia, France, Sweden, Australia, Manchuria and Japan. In Sweden a new method has been devised for the direct extraction of oil from shale beds by electrical heating.

Successful oil production from coal and lignite is reviewed by Mr. Plummer. He refers also to the extensive search being carried on by the U. S. Bureau of Mines in the hydrogenation and liquefaction of these products in this country.

"The experiments," he says, "covered a wide range of rank of coals, including peat, brown coal, lignite, subbituminous and bituminous coal, and lead to the conclusion that hydrogenation under optimum conditions results in high liquefaction yield."

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ELECTRONICS

German Tube Duplicated

In the record-breaking time of three days, American scientists duplicated a complicated radio vacuum tube left behind by the fleeing Nazis.

➤ AMERICAN scientists, in the record-breaking time of three days, duplicated a complicated radio vacuum tube which had never before been made in the United States so that Yank fighting forces in Europe could make use of strategic telephone communications equipment abandoned by the Nazi armies in their retreat in Belgium and France, reports the *Bell Laboratories Record*, (March).

In retreat the Germans had left their communications equipment substantially intact, except that they removed nearly all the radio tubes. They probably thought that without the tubes we could not operate the telephone equipment and there was little chance of our being able to duplicate a strange-looking tube which we had never produced before.

But, once again, the Nazi judgment was wrong.

Our Army turned a sample tube and the problem over to an official of the Office of Scientific Research and Development. It wanted 1,000 duplicates at once. Rushed to the United States, the tube was examined by engineers of Bell Laboratories and the Western Electric

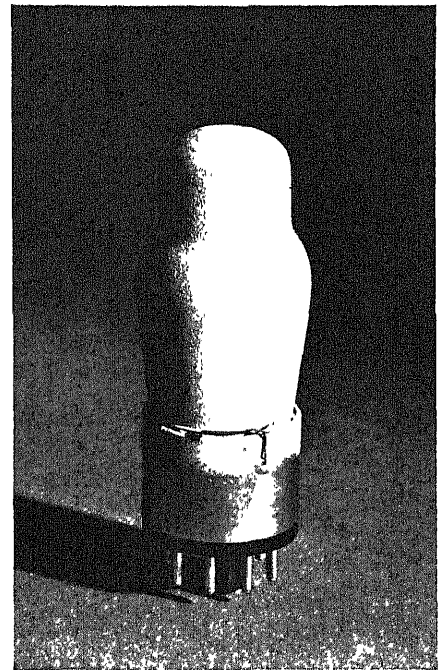
Company. Included in the group were J. O. McNally, G. T. Ford, C. Depew, and W. Gronros.

The German tube was a cathode-type pentode made by Siemens Halske. It was different from any known American tube not only in electrical characteristics and in heater voltage but also in the dimensions of the bulb and base and in the arrangement of the pins which fit into the socket base. Furthermore, as is common in Europe, the bulb of the tube was sprayed with metal for purposes of electrostatic shielding.

Within three days eight replicas of the German tube were designed from available parts used in American tubes, some of which had to be adapted, and the tubes were on their way to the battle-front in Europe. Within three weeks the entire 1,000 tubes were delivered. Equipped with these tubes, the Nazi communications equipment worked.

For the part they played in designing and making the tube, Dr. Vannevar Bush, Director of OSRD, sent a special telegram of commendation to the scientists responsible.

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RADIO TUBE—This is one of the thousand tubes that were duplicated to put a German telephone system to work for our Army.

in the Arctic regions show caves that are good for shelter. The Quartermaster Corps has maps keyed to the clothing they should issue in any month in any part of the world.

The paper on which Army maps are printed will stand abuse in the tropics, desert, arctic, and at high altitudes, Lt. Col. Mast revealed. It can be folded 3,540 times in one place before it will tear.

In describing the tests to which the map paper was put before it was accepted, Col. Mast stated, "We ran it through a G.I. laundry with dirty clothes, then dried it. We wet it again and tacked it on the floor for people to walk over for a day. Mud, axle grease, and paint were slathered over it, and it was dipped in gasoline. Most of these tests didn't noticeably affect it."

One of the testing engineers got a little desperate in the face of the paper's indestructibility. He took a section from the map being tested and burned it. His report concluded, "Map burns easily."

Science News Letter, March 31, 1945

The *milkweed butterfly* secretes a disagreeable fluid to keep from being eaten by birds.

Oystershell and grit not only help the hen digest food but also help supply the calcium carbonate of which the egg-shell is almost wholly composed.

CARTOGRAPHY

"Handkerchief Map"

➤ MORE MAPS than were ever needed in any other conflict are required to fight World War II, reports Lt. Col. Frederick W. Mast, executive officer of the Army Map Service. In the Normandy invasion each soldier was supplied with over 130 square feet of maps. These maps are about equal to 40 or 50 road maps of the type distributed at gasoline stations. For this one operation about 70,000,000 maps, over 3,100 different kinds, weighing 3,480 tons, were produced.

"Every branch of our fighting forces requires special maps," Col. Mast pointed out. "Our paratroopers are supplied with maps that glow in the dark, so they don't have to use lights . . . which might give them away to the enemy. Our amphibious forces have maps that show high and low water areas, cliffs, and particu-

lar beaches that are likely to be slimy and slippery at low tide."

Speaking as the guest of Watson Davis, director of Science Service, on "Adventures in Science," a CBS radio feature, Lt. Col. Mast continued, "Perhaps one of the most interesting maps is the map now found in many air-sea rescue kits. It is printed on a Celanese pocket handkerchief which is proof against salt water and sun heat."

It was pointed out by Mr. Davis that this handkerchief map has probably saved the lives of many of our men forced down at sea.

In the battle of North Africa against Field Marshal Rommel, General Wavell had special maps which showed the probable movement of sand dunes during certain seasons. The maps our troops use

PLANT PATHOLOGY

Disease of Tomato Plants From Use of Weed Killer

➤ A SAD story of ill consequences following an effort by farmers to do good in their fields is told by Dr. John T. Middleton of the California Experiment Station at Riverside, Calif. A disease of tomato plants that seemed to be a kind of mosaic appeared in certain California tomato fields. Leaves were mottled, fruits few in number and small in size. However, efforts to reproduce it by inoculating other plants with juice from diseased specimens were found to be unsuccessful.

When a check-up was made of the history of the fields in which the trouble occurred, it was learned that in every case a chemical weed-killer, sodium chlorate, had been used at some time in the past in an effort to control bindweed, one of the worst of plant pests. The more recent the treatment, the more severe were the symptoms on the tomato plants. However, effects were noted when the last application of the chlorate had been made five years previously.

Science News Letter, March 31, 1945

AERONAUTICS

British Jet Propelled Planes Are Announced

➤ THE FIRST jet-propelled plane to be used by the Allies in action against the enemy is the "Gloster Meteor," a British plane which was brought out from under the cloak of secrecy at the same time that information was released on the American P-80, "Shooting Star." It was used in France against the Germans last summer.

Although the exterior design differs from the Lockheed-built plane, the jet operation is similar, since both planes are powered by engines developed from basic designs of Air Commodore Frank Whittle. The P-80's engines are produced by General Electric, while the jet engines of the British plane are a Rolls Royce product.

The Rolls Royce engine is reported to be more efficient and have a longer life than the JUMO engine of the German Messerschmitt Me 262, the Nazis' jet plane. The engine emits no flame, as does the jet propulsion unit of the flying bomb; and in only certain rare conditions does it leave any smoke trails. The passage of a jet plane on the ground leaves in its wake the characteristic smell

given off by a hot kerosene stove or a storm lantern.

Called the "Squirt" by Royal Air Force pilots, they have plenty of power, and are easy to handle at high speeds. Pilots who have flown Spitfire planes, equipped with conventional reciprocating engines, prefer the jet-propelled craft.

Science News Letter, March 31, 1945

MEDICINE

Critical Shortage Exists Of Physical Therapists

➤ MORE THAN a million dollars has been appropriated by the National Foundation for Infantile Paralysis to train physical therapists, Basil O'Connor, the foundation's president, has announced.

A "critical shortage" of qualified specialists in this field exists, he said. More than half of the nation's 2,500 physical therapists are in the armed forces, but double this number, 5,000, could be used for treating infantile paralysis victims alone, he pointed out.

Of the \$1,267,600 appropriated, \$1,107,000 will be for scholarships to train new physical therapists, \$82,000 for fellowships to provide additional teachers, and \$78,600 for general development of the field of physical therapy.

Applications for scholarships should be made to the National Foundation for Infantile Paralysis or to the American Physiotherapy Association. Applicants should be graduates in nursing, physical educators or have had two years' college training including biology and other basic sciences.

A special committee to assist in development of the new program has been formed under the chairmanship of Dr. Irvin Abell, Louisville, Ky., chairman of the board of regents of the American College of Surgeons.

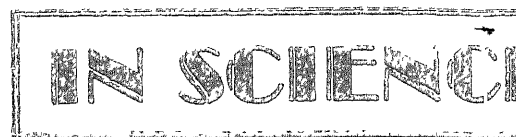
Science News Letter, March 31, 1945

AGRICULTURE

Plant Patent on New Sugarcane Variety

➤ ONE LONE plant patent issued last week contrasts with 571 "regular" patents. The plant patent, No. 655, protects a new variety of sugarcane, bred by Dr. B. A. Bourne of Clewiston, Fla., who has assigned his rights to the United States Sugar Corporation. The new cane is described as heavy-stalked, rich in sugar, highly resistant to half-a-dozen plant diseases, maturing from mid-season to late.

Science News Letter, March 31, 1945



SOIL SCIENCE

Epsom Salts Useful as Horticultural Fertilizer

➤ EPSOM SALTS, old standby of the family medicine chest, can be useful as a horticultural fertilizer, reports Prof. W. L. Powers of Oregon State College (*Science*, Mar. 23).

The salts' chief value is in correcting a shortage of the essential element magnesium in certain soil types. Epsom salts, in the chemists' vocabulary, is magnesium sulfate.

In one test with the unusual fertilizer, a deficiency disease that caused blotched leaves on gooseberries was remedied. Yield of the berries was materially increased, and their content of vitamin C was found to be 24.4% higher than that of berries grown on untreated soil of the same type.

Science News Letter, March 31, 1945

CARTOGRAPHY

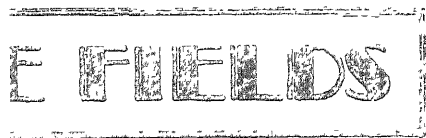
Coast Lines Surveyed Before Japs Surrender

➤ FOLLOWING close upon the heels of invasion forces attacking islands in the Pacific held by the Japanese, members of the Hydrographic Office and the Coast and Geodetic Survey get to work surveying coast lines, measuring the depth of waters and preparing charts of harbors for ships that may have to be brought in with supplies. This work is often carried on while bullets, shells and rockets are still whizzing through the air.

This information is vitally important to our amphibious operations, to permit the correct types of landing craft to be used, the Navy Department reports. More than 150,000 charts have been prepared for use in the theater. Charts of harbors have been issued days before a campaign was officially completed.

The chart depot is located in the Admiralty Islands under the supervision of Comdr. Lyman D. Graham, of Oakland, Calif., and Lt. C. M. Criswell, of Philadelphia, Pa. This chart depot assists in providing information regarding islands and harbors destined to be occupied by American amphibious task forces. Information gathered for charts is also transmitted to Washington, D. C., where it is disseminated.

Science News Letter, March 31, 1945



CHEMISTRY

Compound Keeps Aviation Oil from Thickening

➤ A NEW organic chemical compound has been developed, for mixing with aviation oils in aircraft, which prevents dangerous thickening at extreme low temperatures and excessive thinning in tropical heat. Warplanes, using the mixture, can climb from desert heat to far-below-zero temperatures in the stratosphere with assurance that their mechanisms operated by hydraulic oils will continue to work, and recoil oils will function properly.

The new material, developed by the Rohm and Haas Company, is a water-white acrylic polymer, known as Acryloid HF. Acrylics are the foundation of the transparent plastic that is widely used in aviation for bomber noses, gun blisters and other plane enclosures.

Power transmission using hydraulic oils raises and lowers landing gear, operates power turrets, and controls rudders, elevators, ailerons, and even propeller pitch. The recoil oil is the shock-absorbing medium in guns of large and intermediate calibers. If the recoil oil freezes, the plane might readily be torn apart by the kick of its own guns. If the hydraulic oils thicken too much, controls and power transmission mechanism will fail to operate. These dangerous conditions will not arise, it is claimed, when the new organic compound is properly mixed with the oil.

Science News Letter, March 31, 1945

CHEMISTRY

Melting Point of Alumina Is Lower Than Supposed

➤ ALUMINA, the common oxide of aluminum which is used as an essential ingredient of super-duty spark plug insulators, high-temperature refractories, and insulators in the field of electronics, has a lower melting point than previously supposed, it is now determined by the National Bureau of Standards.

As a result of recent measurements made by R. F. Geller and P. J. Yavorsky of the Bureau staff, the melting point of alumina has been determined as lying within the range 3630 to 3690 degrees Fahrenheit. This is lower than the value usually quoted, 3720 degrees.

A reasonably accurate knowledge of the melting point of this material is important because of its wide industrial uses. Three samples containing over 99.9% of alumina were used in the tests. They were heated in an oxidizing atmosphere in an electric furnace, and the temperatures determined by means of an optical pyrometer.

Science News Letter, March 31, 1945

MEDICINE

Highest Soviet Title Given to Army Surgeon

➤ THE HIGHEST Soviet title, Hero of Socialist Labor, has been given to Academician Justin Janelidze, Lieutenant General of the Red Army Medical Service, according to a report recently received from the Soviet Scientists' Antifascist Committee.

The title was awarded for outstanding services rendered in developing Soviet surgery and in effecting improvements in surgery in naval hospitals and naval medical schools in wartime. Gen. Janelidze is a member of the Academy of Sciences of the USSR and a well-known surgeon who has specialized in surgery of the heart.

Science News Letter, March 31, 1945

BIOLOGY

Glycerin Produced by Action of Bacteria

➤ GLYCERIN has been produced by the action of a strain of bacteria on a glucose solution, in experiments conducted under the auspices of the Division of Applied Biology, National Research Council of Canada. The work is briefly reported in *Science* (Mar. 9), by Prof. A. C. Neish, A. G. Blackwood and Dr. G. A. Ledingham; full details will soon appear in the *Canadian Journal of Research*.

The special bacteria used are known as Ford's strain of *Bacillus subtilis*. The three researchers state that to the best of their knowledge this is the first time any species of bacteria has been shown to yield glycerin through the breakdown of a carbohydrate.

Some years ago, glycerin was produced in Germany by yeast fermentation; but yeasts are quite different organisms from bacteria, though both are microscopic. A somewhat analogous fermentation process, with molds as the active organisms, produced butylene glycol in experiments at the Northern Regional Laboratory of the U. S. Department of Agriculture.

Science News Letter, March 31, 1945

INVENTION

Seagoing Patrol Craft May Use Sail for Cruising

➤ MEMORIES of the historic Wasp and Hornet, and the many other small but swift-sailing and sharp-stinging ships of the early American Navy, are revived in a proposal to put at least a small part of the modern Navy under sail again. This idea is embodied in a design for a seagoing patrol craft that will use sail for ordinary cruising, at an approximately 13-knot speed, but can turn on a powerful internal-combustion engine and charge ahead at 25 knots when a submarine is detected, or some other fighting emergency arises. The designer, A. A. Steele of Los Angeles, has been awarded U. S. patent 2,371,478.

High speed is attained on moderate size through the use of long concavities under the hull, which trap air over which the craft rides. The designer states that on a 96-foot ship of this type a crew of 18 can be carried, with fighting equipment that will include 40-millimeter guns, depth charges and listening devices. Patrolling noiselessly under sail, the craft will not betray its presence to listening submarines, while it can pick up the throb of the U-boat's diesels or the hum of its motors and be ready to strike before the enemy is aware of its presence.

Science News Letter, March 31, 1945

GENERAL SCIENCE

Franklin Institute Medals To Be Awarded in April

➤ THE BROWN medal of the Franklin Institute will be presented April 18 to Dean Gilmore D. Clarke of Cornell University of Architecture, for outstanding work in town and city planning, and the Clamer medal to Dr. Zay Jeffries of the General Electric Co. for work in the science of metals.

The Howard N. Potts gold medal has been awarded to Edwin A. Link, president of Link Aviation Devices, Inc., Binghamton, N. Y., for valuable contributions in aviation training devices.

The Longstreth medal has been awarded to Sanford L. Cluett of Troy, N. Y., and the Louis E. Levy medal to Dr. Rupen Eksbergian, consulting engineer of the Edw. G. Budd Manufacturing Company. Mr. Cluett is honored for the processes developed by him for pre-shrinking fabrics, known as "Sanforizing", and Dr. Eksbergian for a paper on the reaction of fluids and fluid jets.

Science News Letter, March 31, 1945

ASTRONOMY

Springtime Skies Here

High in the south appears the figure of Leo, the lion; Jupiter is the brightest object during most of the evening at the present time.

By JAMES STOKLEY

➤ WITH the coming of April, the appearance of the evening skies, as well as the weather, attest to the fact that spring has come and winter is left behind. Orion's glorious figure, so dominant in the evening in January, is just glimpsed low in the west. Instead, high in the south, appears the figure of Leo, the lion. To the right in this group is the familiar "sickle," with the blade of that implement forming the lion's head. Joining the stars in Leo, at the present time, is the planet Jupiter, brightest object during most of the evening.

On the accompanying maps are pictured the stars and planets seen on April evenings, about 11:00 p. m., your own kind of war time, at the beginning of April, and about 10:00 p. m. on the 15th. Sirius, the brightest star, is still visible, in the southwest, to the left of Orion. Above it is Canis Minor, the lesser dog, with first magnitude Procyon. Directly west, above Orion, is the constellation of Gemini, the twins. Like Leo, this group also contains a planet—Saturn—which is fainter than Jupiter but brighter than most of the stars. The brightest star in Gemini is Pollux, alongside which is seen Castor, the other twin.

In the southeast, extending downwards to the left from Jupiter, is the group of Virgo, the virgin, and in this is the bright star Spica. Above the eastern end of Virgo is Bootes, of which the star Arcturus is the prominent member.

Capella Prominent

The most prominent star in the northern half of the sky, as the maps show it, is Capella, in Auriga, the charioteer, which is in the northwest, to the right of the foot of Castor, where Saturn is seen. Aldebaran, in Taurus, the bull, is lower, but when it gets as close to the horizon as here depicted the absorption of light by the earth's atmosphere dims its brightness, so it seems only of the second magnitude, whereas it is actually of the first. The same thing is true of Vega, in Lyra, the lyre, which is shown very low in the northeast. But while Aldebaran is now

about to disappear from the evening skies entirely, Vega, during the coming months, will be coming into a better position.

Ursa Major, the great bear, of which the dipper is the best known part, is now in its highest position of the year, directly above the pole star, Polaris, to which the pointers are guide posts. The W-shaped figure of Cassiopeia is low in the north. Winding around the little dipper, of which the pole star is part, is the group of Draco, the dragon. Next to the little quadrilateral of stars at the bottom which form the dragon's head is Hercules, the strong man, which, like Vega, will come into better view during the late spring and summer.

In the latter part of the month, the moon will move through some of the constellations shown. New on April 12, a day or two later it will be glimpsed as a narrow crescent low in the west after sunset. By April 15 it will be in the constellation of Taurus. Early in the morning of the 17th, when it is not visible, it will be close to Saturn. First quarter comes on the 19th, when it is in Cancer, the crab. During the following week, in a gibbous phase, it moves through Leo and Virgo, until April 27, the date of full moon, when it stands in the direction of Libra, the scales. During the night of April 22 it will pass Jupiter, at a distance of about 6 lunar diameters.

One other planet will be seen at the

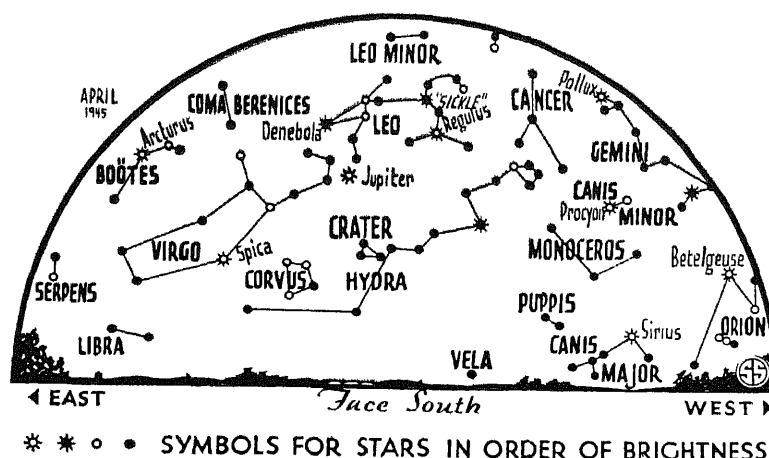
beginning of the month when Venus is still visible low in the west in the early evening. It is rapidly drawing toward the sun, however, and is nearly in line with it on the 15th. Then, as it passes to the west of the sun, it rises in the east before sunrise and at the end of the month will be visible there as a morning star.

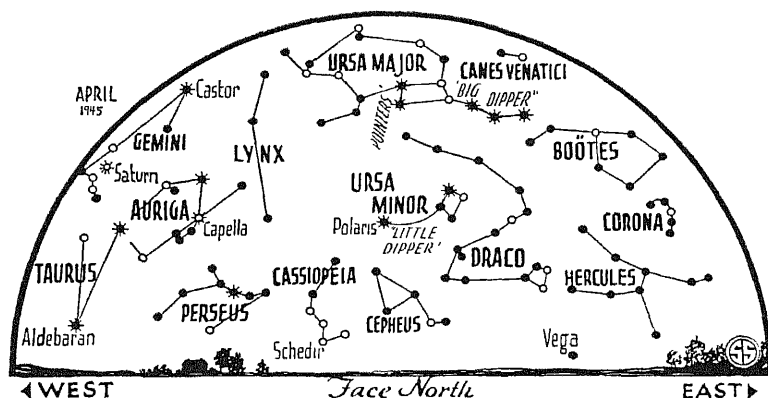
This month, as Venus shifts from evening to morning star, we have an example of something that was very puzzling to the ancients. They saw this planet in both positions, but it was a long time before they realized that it was one and the same. When it was a morning star they called it Phosphorus, while Hesperus was the name given to its evening manifestation.

The same thing was true of Mercury, which at the end of March was visible in the west after sunset, and in May will be a morning star, on the other side of the sun. They called it Mercury when it was in the evening, but Apollo in the morning.

Both Revolve Around Sun

Actually, these planets both revolve around the sun and both move in orbits that are smaller than that of the earth. Every 116 days Mercury comes approximately between the sun and earth at "inferior conjunction." About 22 days before this it is at its greatest distance or "elongation" east of the sun, when it is visible in the evening for a while after sunset. About 22 days after inferior conjunction it is farthest west of the sun—a morning star. Then about 72 days elapse while it swings around behind the sun, again coming to its evening position. Because Mercury is so close to the sun—at a





distance of but 36,000,000 miles—it is only visible when near one or the other elongation.

Venus, on the other hand, is at a mean distance from the sun of 67,000,000 miles, so it is visible over a much larger part of its orbit. Only near its inferior conjunction, which occurs April 15, or the superior conjunction, when it is on the far side of the sun, is it completely invisible. The greatest eastern elongation, such as recently brought it into view in the evening, comes about 72 days before inferior conjunction, and greatest western elongation about the same time afterwards. Then about 440 days elapse while it slowly creeps behind the sun, and again comes into view in the evening. About

this time next year it will come into the evening sky once more, gradually brightening until it attains the maximum brilliancy just before Christmas, 1946.

Celestial Time Table for April

Apr.	EWI	
5	3:18 p.m.	Moon in last quarter
9	3:07 p.m.	Moon passes Mars
12	4:00 a.m.	Moon nearest, distance 221,800 miles
	6:54 a.m.	Moon passes Mercury
	8:29 a.m.	New moon
	8:58 a.m.	Moon passes Venus
15	1:00 p.m.	Venus between earth and sun
17	8:52 a.m.	Moon passes Saturn
19	3:46 a.m.	Moon in first quarter
23	1:50 a.m.	Moon passes Jupiter
25	11:00 a.m.	Moon farthest, distance 252,500 miles
27	6:33 p.m.	Full moon

Subtract one hour for CWT, two hours for MWT, and three for PWT.

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AERONAUTICS

World's Largest Airport

► WORLD'S largest airport is a B-29 base on Tinian Island in the Pacific, reports P. B. Taylor, acting general manager of Wright Aeronautical Corporation, who recently completed a 25,000-mile journey of key points in the South Pacific theater. Several 8,000-foot runways for the Superfortresses were cut right out of the jungle, and the whole installation completed in eight weeks, he stated.

Tinian, along with Saipan and Guam, now form the principal air bases for attacks on Japan. The shape of the island closely resembles Manhattan. It is about ten miles from north to south and four miles wide at its center. U. S. troops stationed there have named parts of the island for familiar New York City areas, including the Bowery, Broadway, and Columbus Circle.

Unlike airports in the United States which have a number of runways crisscrossing each other so that planes may

take off into the wind, and land with the wind, there are no cross strips on the Tinian field. Pilots take the winds as they find them, coming in fast for landings and relying on the steel mats used to surface the runways to stop the plane short, Mr. Taylor pointed out.

When U. S. forces seized Tinian from the Japanese, they found only one landing strip on the heavily fortified island. This landing strip was so inadequate and poorly built that our Army and Navy built the new larger landing strips right over the top of it, he commented.

The climate on Tinian is comparable to that of the Philippines, although the heat is not as intense. It is a low coralline limestone island without prominent elevations.

Tinian is one of the Mariana group that stretches northward from Guam about 550 miles. The group was named in 1688 in honor of Maria Anna of Austria. In 1914, the Japs took all of them

except Guam from Germany, who had bought them from Spain in 1889. Japan stole Guam from the United States soon after Pearl Harbor, and held it for about two and a half years.

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AERONAUTICS

Huge Steel Propellers In Quantity Production

► AMERICA'S largest four-bladed hollow steel propeller is now in quantity production for use on the huge flying boat Mars and army warplanes. The propeller measures 16 feet 8 inches from tip to tip, and is designed to absorb approximately 3,000 horsepower.

The new propeller was developed after three years of joint research by the Army Air Forces Materiel Command and the Curtiss-Wright Corporation.

The new propellers are full-feathering. That means that the blades can be turned to approximately a 90-degree angle of pitch, thereby preventing the propeller from windmilling and causing excessive vibration in the event of engine failure. With motion stopped, it presents a minimum amount of drag.

Science News Letter, March 31, 1945

No fungicide is known that arrests fungi in their early stages and prevents them from forming colonies, and is also non-corrosive, non-toxic to humans, permanent and colorless.

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Do You Know?

Insects kill more trees annually than forest fires.

Julius Caesar used army *pigeons* as messengers nearly 2,000 years ago.

Pineapple production in Cuba in 1945 will be some 40% greater than in 1944, it is now estimated.

Very few of the *marine bacteria* plentiful in ocean waters cause diseases in the habitants of the sea and none cause diseases in man.

Rubber-lined iron pipe is used successfully in pumping water from coal mines when the water carries enough sulfur to corrode unprotected metal.

Sand containing calcium chloride is used on icy roads to prevent skidding; 50 pounds of the chemical to a cubic yard of the abrasive is the usual mix.

Spain produces annually approximately 80,000,000 *bottles* of all kinds; one-half are wine bottles and less than 1% milk bottles and fruit jars.

Postwar household *furniture* made of aluminum and magnesium will be so light that the housewife will be able to move it around without the help of her husband.

Diluted *lemon juice* completely loses its vitamin C potency after four days, but oxidation can be prevented by the addition of pyrophosphate so that 16% is present after 30 days.

Birds in perched nests usually are helpless for many days after being hatched, while the young of birds that nest on the ground are able to run and feed soon after hatching.

Airplane *cargoes* have now included a shipment of bees to Alaska, frogs from Argentina to U. S. sugarcane areas, baby chicks to the West Indies, and wasps from Cuba to Mexico to kill the Mexican black fly.

Apples are being stored experimentally under water in a Canadian lake; 200 tons of them are suspended 10 feet below the surface in nets under piers and will be used later for apple by-products if satisfactorily preserved.

MILITARY SCIENCE

Shooting Doesn't Hurt!

With the new frangible bullet, you can be shot at with live ammunition that will pierce armor plate, and you won't be hurt at all.

➤ YOU CAN now experience the feeling of being shot at by a machine gun, having live ammunition that will pierce ordinary armor plate fired at you, and you won't be hurt at all. The secret behind this dramatic experience is a new frangible bullet, that is, a bullet with a slug that is easily broken when it strikes special armor plate.

Developed for the use of Lt. Gen. Barton K. Yount's AAF Training Command, the frangible bullet now permits student gunners to shoot live ammunition from real B-17 and B-24 bombers in the air at specially built target fighter planes. These fighter planes, piloted by ex-combat men, duplicate every known maneuver of enemy fighters in hot aerial sham battles.

The frangible bullet is the result of research done at Duke University by Maj. Cameron Fairchild. It is made from a combination of lead and plastic material, hard enough to withstand being fired through a machine gun and able to pierce ordinary armor plate. But the slug will spatter harmlessly into fine powder, like salt, on contact with duraluminum alloy armor, especially treated, and mounted on target planes, which are a modification of the P-63 "Kingcobra."

Like a drop of water shooting through the air at high velocity, the slug of the frangible bullet disintegrates upon striking the target. Seated in a plane only 1,000 inches away from a standard machine gun, you can be shot at with frangible bullets. They spatter over the wings and even hit the bullet-proof glass windows around the cockpit. You hear only "pops" like those made when a cork is pulled out of a bottle. If you hold your finger up behind the glass, and have a bullet fired point blank at your finger, you only feel a slight sting when it touches the glass.

In practice aerial missions, when student gunners hit the target plane with frangible bullets, a beacon lamp flashes brightly in the nose, where the P-63's gun is usually located, to tell the gunner whether or not he scored a hit. Thus gunners develop the ability to recognize

the split-second opportunities they will get later on in real combat to kill an enemy plane.

Right from the start of his training, the gunner gets the feel of the weapons he will use later on. One of the first devices he encounters is the "Spotlight Trainer." A beam of light races along a circular wall, tracing a pattern that represents the speed and movement of an attacking enemy fighter. The trainer's hollow guns contain photoelectric cells. When the student lines up his sights he presses the trigger, exposing the photocell. If he has aimed correctly, the light rays from the spot on the wall register in the cell, and the student's hits are indicated on an automatic sounding and recording device. The average student increases from 350 to 850 hits per thousand shots during this phase of training.

Designed to bridge the gap between theory and actual combat, the Jam Handy trainer gives student gunners the "feel" of air warfare by letting them fire bursts of light instead of bullets at enemy airplanes on a movie screen. The trainer consists of a synthetic gun, two 16-millimeter movie projectors and an ordinary screen. Four gun positions are located in front of a cluster of five synchronized movie projectors. In front of them is a huge concave movie screen. The whole unit is designed to simulate actual flying conditions. Pictures of Jap and Nazi planes are thrown on the screen. The student must accurately compute the relative speed and apparent motion of the attacking plane so as to calculate the proper lead or deflection in placing of his sights in order to score a hit.

Following the training with synthetic devices, student gunners go out to gain practical experience with real guns onto firing ranges where they shoot at stationary and moving targets, and at moving targets when they too are moving on the deck of a truck.

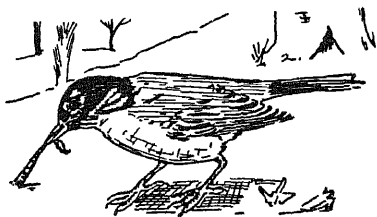
The next step takes them into the air, for sham combat. Finally they graduate and go overseas with knowledge that surpasses that of any enemy gunner, knowledge that will help them to bring the war to a speedier conclusion.

Science News Letter, March 31, 1945

ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



The Early Worm

➤ ROBINS, when they appear on their northward migration, are universally taken as the first authentic sign of spring. No one can resist robins. They are anything but shy; you always know when they hit town. They are as shoutingly optimistic as Walt Whitman, as cheerfully conspicuous as a convention of Legionnaires or Shriners. They are the go-getters among birds.

What they go-get, in early spring at least, seems to be mostly earthworms. How they spot them nobody seems to know. But you'll see a robin make a few dirt scattering dabs with his beak, then haul the luckless annelid up and gobble it down. When we see a robin in a tug-of-war with a worm, we all forget the traditional American sympathy for the underdog and root for the robin.

Actually, if we were mindful of our own selfish interests as human beings, we'd be pulling for the worm—maybe even throwing clods at the robin to make him desist from his murderous assault. For earthworms are among the most useful of all wild animals, in terms of their importance to human welfare. The millions of them that inhabit the topsoil of every fertile field make a mass contribution to our agriculture that would be hard to estimate in dollars and cents.

For untold ages, earthworms have been doing for the soil what man has begun to do only with his latest inventions—plow and fertilize it at the same time. They make innumerable burrows, which go to considerable depths. They hide in these during the daytime and reach out of them at night to seize and drag back fragments of leaves for food. The partly digested remains of this material, mixed with earth that has passed through their bodies and deposited as "worm casts" at the mouths of the bur-

rows, are a major factor in enriching the soil with humus. The burrows themselves provide means for soil aeration, help mightily in getting water into the ground that would otherwise be lost as runoff, and make root penetration much easier.

Although robins and other birds do take considerable toll of earthworms, it

is to be doubted that their inroads do any real damage to agricultural interests. There are so many worms, and they multiply so rapidly, that these small gaps in their ranks are hardly noticeable. Nevertheless, when we see a worm vanishing down a robin's gullet we might at least spare a sympathetic thought for the poor thing.

Science News Letter, March 31, 1945



Why 109 Kinds of Optical Glass?



Bending light to the will of man, making it accomplish miracles, this is the job that optical glass does.

Creating the required types of glass, and adapting them to the thousands of precision operations they are to perform, is the task of Bausch & Lomb, America's large scale producer of optical glass and the only company currently producing 109 kinds.

Many of these glasses may look alike, but to the optical expert each is different. That difference is marked by specific qualities of refraction, dispersion, and transmission.

Only by having available all of these types of glass . . . and the ability to create new types when needed . . . has Bausch & Lomb been able to meet the optical instrument needs of science and industry in times of peace . . . the needs of our armed forces for highly precise military optical instruments. Bausch & Lomb Optical Co., Rochester 2, New York.

BAUSCH & LOMB

ESTABLISHED 1853



Makers of Optical Glass and a Complete Line of Optical Instruments for Military Use, Education, Research, Industry, and Eyesight Correction and Conservation

NUTRITION

Jap Soldier Well Fed

Under most circumstances he eats twice as well as his family at home, getting some meat, fruits, extra vegetables and even candy.

➤ THE JAPANESE soldier eats well, if not by American standards, at least by Japanese standards. Under most circumstances he eats twice as well as his family at home. While the folks at home are managing to live on a diet of rice, fish, and vegetables, the little yellow men of the Mikado's army get some meat, fruits, extra vegetables, and even candy to flavor and vary the staple diet of rice and fish.

The food problem in the Japanese army is a great deal different from our own. There are no company or squadron messes. Each Nip is his own cook, and he usually prepares enough at one time to last him for 24 hours.

There are no well-balanced field rations such as are supplied to our troops. The Jap soldier going into battle carries rice and small hard biscuits. On occasion he carries canned meat. There are two types of packaged field rations, each containing a complete meal. In one type there are cakes of compressed wheat or barley, sugar, cakes of dried fish, and cakes of salty dried plums. The other type contains two cakes of a compressed fish-and-vegetable mixture, looking like our

familiar bouillon cube, and a sack of pre-cooked rice flour. The soldier mixes the flour with water to make a doughy substance which he eats cold.

The Nip airmen fare a little better than the ground forces. Aviation rations include such items as dried fish, pickled plums, peas, hard candy, chocolate, whisky, canned pineapple, hardboiled eggs, cider, and cans of meats and vegetables mixed together in a stew or hash.

Water is always a problem for the Japs, since they cannot take the salts out of sea water. On Saipan, the Jap soldiers carried water sausages made of a cellulose sheeting filled with water and tied off into short links. When a Jap got thirsty he just bit into a link. This water sausage was draped around the neck or carried in the pocket.

Blind obedience is drilled into the Jap soldier from the time he starts his training. Before the war a company of Jap soldiers on summer maneuvers received orders not to drink from their canteens until given permission to do so by their commanding officer. About 20 men fell to the ground from thirst and exhaustion

and five died. An examination of their canteens revealed that they had not been touched.

Science News Letter, March 31, 1945

HORTICULTURE

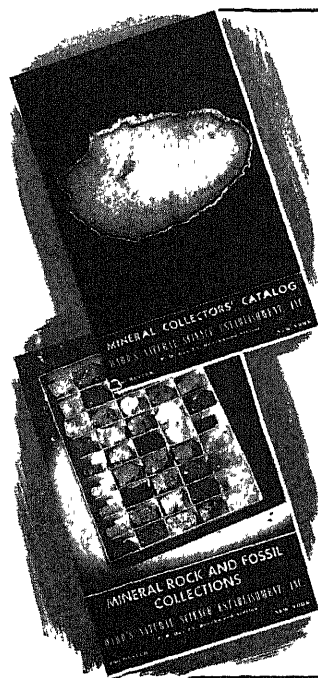
Corn From One Planting Available All Season

➤ NEW HYBRIDS of sweetcorn developed during the past season, used in connection with older hybrids, will make it possible for the home gardener from one planting to pluck corn in the pink of condition every day from early summer to frost. These new hybrids were developed by the Connecticut Agricultural Experiment Station, and although not yet thoroughly tested give good promise. One matures earlier than older early hybrids, the other later than the better-known late varieties.

If six varieties of corn, in what is called a succession series by the station, are planted at the same time, mature corn will be available throughout the season. As one passes maturity the next will be ready for the table. The new hybrids are expected to extend the sweetcorn season appreciably. Information on the succession series is available in the annual sweetcorn report of the station.

Science News Letter, March 31, 1945

A synthetic transparent *chemical* has been perfected that absorbs 99.9% of the ultraviolet radiations of the sun for use in plastic goggle lenses.



Like Mineral Study?

WARD'S IS WORLD HEADQUARTERS FOR TEACHING SPECIMENS AND COLLECTIONS... AND FOR RARE AND BEAUTIFUL EXHIBITION MINERALS

• Mineralogy instructors and departments look to Ward's as the world's foremost supplier of teaching specimens and collections. Mineral collectors, too—those who delight in the collection and study of specimens that portray the wondrous structure and formation of our earth—find at Ward's minerals of rare beauty and interest. Catalogs (at left) available on request: N-441, Mineral Specimens for Collectors and Museums; N-443, Mineral Rock and Fossil Collections.

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Manufacturer Wants INVENTIONS

INVENTORS—The Lion Manufacturing Corporation of Chicago, a highly rated concern, employing 1,400; is interested in inventions for their plant and affiliated companies. Our interest is in patented or patentable electrical or mechanical devices for post-war development in the following fields: Radio and Television, Sound and Recording, Household Appliances, Vending Machines, Coin Operated Amusement Devices, in fact almost anything of metal or plastic. We invite inventors to send us details concerning their patented inventions. If your invention is not patented, tell us in a general way what you have to offer. If we are interested, we shall inform you how to communicate details without endangering your rights.

LION MANUFACTURING CORPORATION
Department U
135 S. La Salle Street, Chicago 3, Illinois

Books of the Week

➤ **JANE'S FIGHTING SHIPS** for 1943-44 has just appeared in its American edition—delay in publication is quite understandable, considering present conditions. Data are corrected to July, 1944. It is exceedingly helpful to anyone who tries to keep abreast of the naval war situation to have access to the new information here made available, even though many more changes have taken place in the intervening months. The war loss section has grown to formidable proportions; it is some satisfaction to note, however, the number of enemy ships so listed. (*Macmillan*, \$19.)

Science News Letter, March 31, 1945

➤ **THREE MORE** numbers have been added to the excellent pamphlet texts known as the Bios Classroom Series. They are **THE HONEYBEE**, by F. C. Pellett; **THE OYSTER**, by R. V. Truitt, and **IN THE BEGINNING: THE ORIGIN OF LIFE**, by C. T. Hurst. (F. G. Brooks, Mt. Vernon, Iowa, 10 cents each.)

Science News Letter, March 31, 1945

➤ **ANTHROPOLOGY** has come into its own in the present war; we have come to realize that in order successfully to combat our enemies and cooperate with our friends it is desirable to know all we can about them as human beings. Ralph Linton, one of the best known of American anthropologists, undertakes to bring the special knowledge of his discipline to bear on immediate problems in **THE SCIENCE OF MAN IN THE WORLD CRISIS** (*Columbia Univ. Press*, \$4), a book that should be required reading for every legislator and every conference delegate—not to mention the corps of administrators who will be required to take care of conquered enemy territory.

Science News Letter, March 31, 1945

➤ **ZOOLOGISTS** around the Upper Great Lakes and the adjacent regions will find a useful field companion in **AMPHIBIANS AND REPTILES OF THE CHICAGO AREA**, by Clifford H. Pope. The species are not only well described, but details of their life histories not often given in a small book are included, together with excellent sketches of some of the more interesting details. There are many good colored plates. (*Chicago Natural History Museum*, \$1.75.)

Science News Letter, March 31, 1945

➤ **MEANINGS** and derivations of words are always fascinating, and to scientists their exact understanding is often of highest importance. It is gratifying, therefore, to find in Robert S. Woods' **THE NATURALIST'S LEXICON** an unusually full and complete vocabulary for the life sciences, including large numbers of little-used or obscure terms. (*Abbey Garden Press*, \$2.75.)

Science News Letter, March 31, 1945

➤ **WILL BEEBE** has built up, in many popular books, an excellent reputation as a naturalist who knows how to write. Now, in **THE BOOK OF NATURALISTS**, he gives us an anthology of the great writing naturalists of the past, from Aristotle and Pliny through Gesner and Linnaeus to Fabre and J. S. Huxley; excellent selections, many of

them classics. It is rather a pity that modesty prevented inclusion of anything by William Beebe. (*Knopf*, \$3.50.)

Science News Letter, March 31, 1945

➤ **QUESTIONS PARENTS ASK** and the answers make up an unusual and helpful section of a new book on sex education of children, **HOW SHALL I TELL MY CHILD?** by Belle S. Mooney (*Cadillac*, \$1.98). After getting their own perplexities solved by this section, they will be better able to make use of the section on questions asked by children and the answers. The "dictionary of physiological terms" at the end might be even more useful if pronunciations were given as well as definitions.

Science News Letter, March 31, 1945

Just Off the Press

ADSORPTION—C. L. Mantell—*McGraw*, 386 p., illus., \$4.50 (Chemical Eng'g Series).

AIRFRAME MATERIALS—F. S. Stewart—*McGraw*, 237 p., illus., \$2.50.

BUILDING INSULATION, a Treatise on the Principles and Application of Heat and Sound Insulation for Buildings—Paul Dunham Close—*Am. Tech. Soc.*, 328 p., illus., \$3.50, 2nd ed.

THE CONTROL OF COMMUNICABLE DISEASES, an Official Report of the American Public Health Association—*Am. Public Health Assn.*, 147 p., paper, 35c, 6th ed.

DISCOVERY OF THE ELEMENTS—Mary Elvira Weeks—*Journal of Chemical Education*, 578 p., illus., \$4.

GERMAN-ENGLISH DICTIONARY OF METALLURGY with Related Material on Ores, Mining and Minerals, Crystallography, Welding, Metal-working, Tools, Metal Products, and Metal Chemistry—T. E. R. Singer—*McGraw*, 298 p., \$4.

HEREDITY IN DAIRY CATTLE, Lessons in Breeding and Herd Development for 4H and FFA Dairy Clubs and other Beginners—James E. Russell—*Am. Guernsey Cattle Club*, 135 p., illus., \$2.50.

HOW SHALL I TELL MY CHILD?, a Parents' Guide to Sex Education for Children—Belle S. Mooney—*Cadillac Pub. Co.*, 192 p., \$1.98.

"HSC" HIGH-SPEED BRAKE EQUIPMENT for Types "A", "B", and "C" Diesel Locomotive Units and Cars with Individual Speed Governor Control—C. M. Drennan—*Am. Tech. Soc.*, 68 p., paper, illus., \$3.50.

INTRODUCTION TO MICROWAVES—Simon Ramo—*McGraw*, 138 p., illus., \$1.75.

ORGANIC CHEMISTRY with Applications to Pharmacy and Medicine—Eldin V. Lynn—*Lea*, 355 p., illus., \$4.50, 2nd ed.

THE PSYCHOLOGY OF DIET AND NUTRITION—Lowell S. Selling and Mary Anna S. Ferraro—*Norton*, 192 p., \$2.75.

ROCKETS AND JETS—Herbert S. Zim—*Harcourt*, 326 p., illus., \$3.

THE STORY OF THE U. S. ARMY AIR FORCES

—Jim Ray—*Garden City Pub. Co., Inc.*, illus., \$2.

A STUDY OF SPONTANEOUS MUTATION—Richard B. Goldschmidt—*Univ. of Calif. Press*, 549 p., paper, illus., \$3.

TRAMPLING OUT THE VINTAGE—Joseph A. Cocannouet—*Univ. of Okla.*, 221 p., \$2.75.

Science News Letter, March 31, 1945

ELECTRONICS

Electronic Vulcanization Of Rubber May Be Common

➤ **THE ELECTRONIC** vulcanization of rubber may become common in the near future, replacing the familiar heating method, with the securingment of the basic patents covering the new process granted on discoveries made by R. A. Dufour and H. A. Leduc of France, and by E. E. W. Kassner of Switzerland. The purchasers of the patents are the B. F. Goodrich Company and the Firestone Tire and Rubber Company, who plan to make them available to other companies in the rubber and plastics industries on a reasonable basis.

Electronic vulcanization will speed production, but, more important, will give more uniform and higher quality products. Vulcanization is the joining of rubber molecules and sulfur. For more than a century, rubber has been vulcanized by applying heat to the outside surface. Since rubber insulates against rather than conducts heat, heating to the core by this method is slow and lacks uniformity. In electronic heating the core is heated quickly. In electronic vulcanization, high-frequency oscillations shake the molecules of rubber and sulfur millions of times a second, creating uniform heat throughout the product being vulcanized in a fraction of the time required when steam heating is used.

Science News Letter, March 31, 1945

Baking soda and water will clean grease effectively from a waffle iron.

NEW "PICK-UP" CANE

Permits Disabled Persons To Pick Up Small Articles Without Painful Stooping.

NO OTHER CANE LIKE IT

The Mason "Pick-Up" is a light double purpose cane with concealed patented pick up mechanism that enables the user by simple finger pressure and without any stooping to easily pick up papers, pencils, cards, coins, etc. Proper balance and rubber grip tip insures safer walking. Use a beautifully finished Mason "Pick-Up" Cane yourself or as a perfect gift for a disabled service man or friend. Write today for FREE CIRCULAR and 5 DAYS TRIAL OFFER.

W. H. MASON Box 27, Leesburgh, Ohio



• New Machines and Gadgets •

⚙️ **THEFT-PROOF** billfold, to balk the pickpocket and warn the owner, has a short end made of a stiff material with a bulging friction edging across its top. When inserted properly in the pocket, if the billfold is pulled upward by grasping the top only, the friction edge causes the stiff fold to open and resist withdrawal.

Science News Letter, March 31, 1945

⚙️ **MAGNETIC TOOL**, for inserting triangular brads used in holding panes of glass in window frames, is a handle with a depressed magnetized forward end. A raised slot on its under surface receives the rear end of a brad and keeps the brad from being pushed too far into the wood.

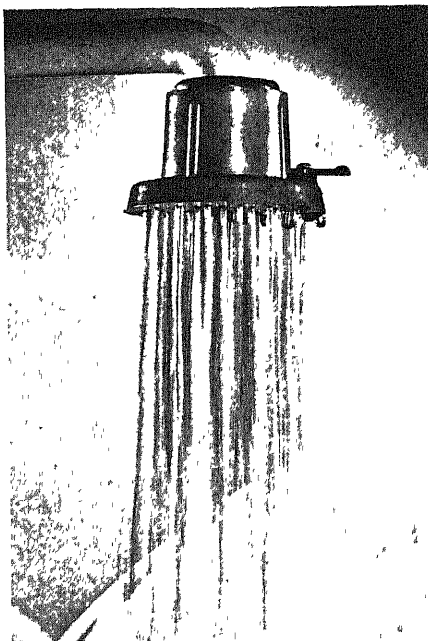
Science News Letter, March 31, 1945

⚙️ **MILITARY TOOL**, usable as a spade, shield, gun rest or wire-cutter, has two complementary half-blades with separate handles. Attached together by a pivot near the blade points, they form a wire-cutting tool when the handles are held apart, and a spade when closed. For other uses the tool is stuck in the ground by pointed ends on the handles.

Science News Letter, March 31, 1945

⚙️ **COMBINATION** storm and screen door, in reality two separate doors which open outward and may be swung as a unit or separately, depends for operation on a three-way hinge with one door hung on each of the free arms of the hinge. The storm door may be fastened open in warm weather.

Science News Letter, March 31, 1945



⚙️ **FAUCET SPRAY** of plastic for the kitchen sink delivers a single center stream of water, or a spray suitable for rinsing dishes and washing vegetables. A flick of the finger on a small lever on the side of device, shown in the picture, controls the opening and closing of the center hole.

Science News Letter, March 31, 1945

⚙️ **INDUSTRIAL** truck auxiliary, for use on factory floors in handling long articles difficult to maneuver in narrow aisles, is a dolly mounted on casters. It can be moved about manually to a limited

degree and can also be transported rapidly between departments by the electric truck.

Science News Letter, March 31, 1945

⚙️ **SAFETY HEATERS**, particularly for laboratory use for heating substances contained in glassware, have electric nickel-chrome heating coils enclosed in an insulated metal housing into which the glass container is put. Heat output, from AC application, may be varied by use of auto-transformer control.

Science News Letter, March 31, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N. St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 252.

BOOKS

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Question Box

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Where is the world's largest airport? p. 203.

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What is the "handkerchief map"? p. 199.

CHEMISTRY

How do resins purify water? p. 194.

What is the melting point of alumina? p. 201.

ELECTRONICS

How long did it take American scientists to duplicate the German radio vacuum tube? p. 199.

How will radar be used for safety? p. 196.

What has made it possible for B-17's to fly indefinitely at altitudes of 30,000 feet? p. 197.

MILITARY SCIENCE

How is it possible to be shot at with live ammunition and not be hurt? p. 204.

NUTRITION

What makes up the diet of Japanese soldiers? p. 206.

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How is it possible to take 8,000 pictures a second? p. 195.

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What effect did the use of sodium chlorate as a weed killer have on tomato plants? p. 200.

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What is the chief value of epsom salts as a fertilizer? p. 200.

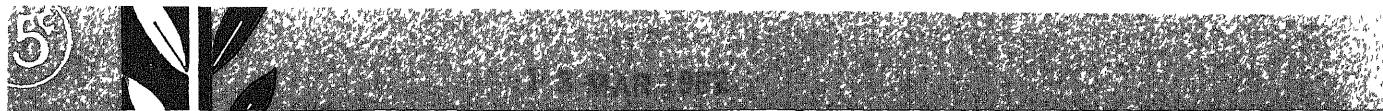
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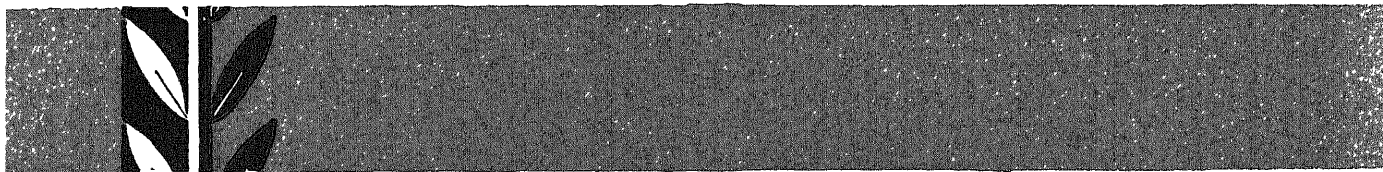
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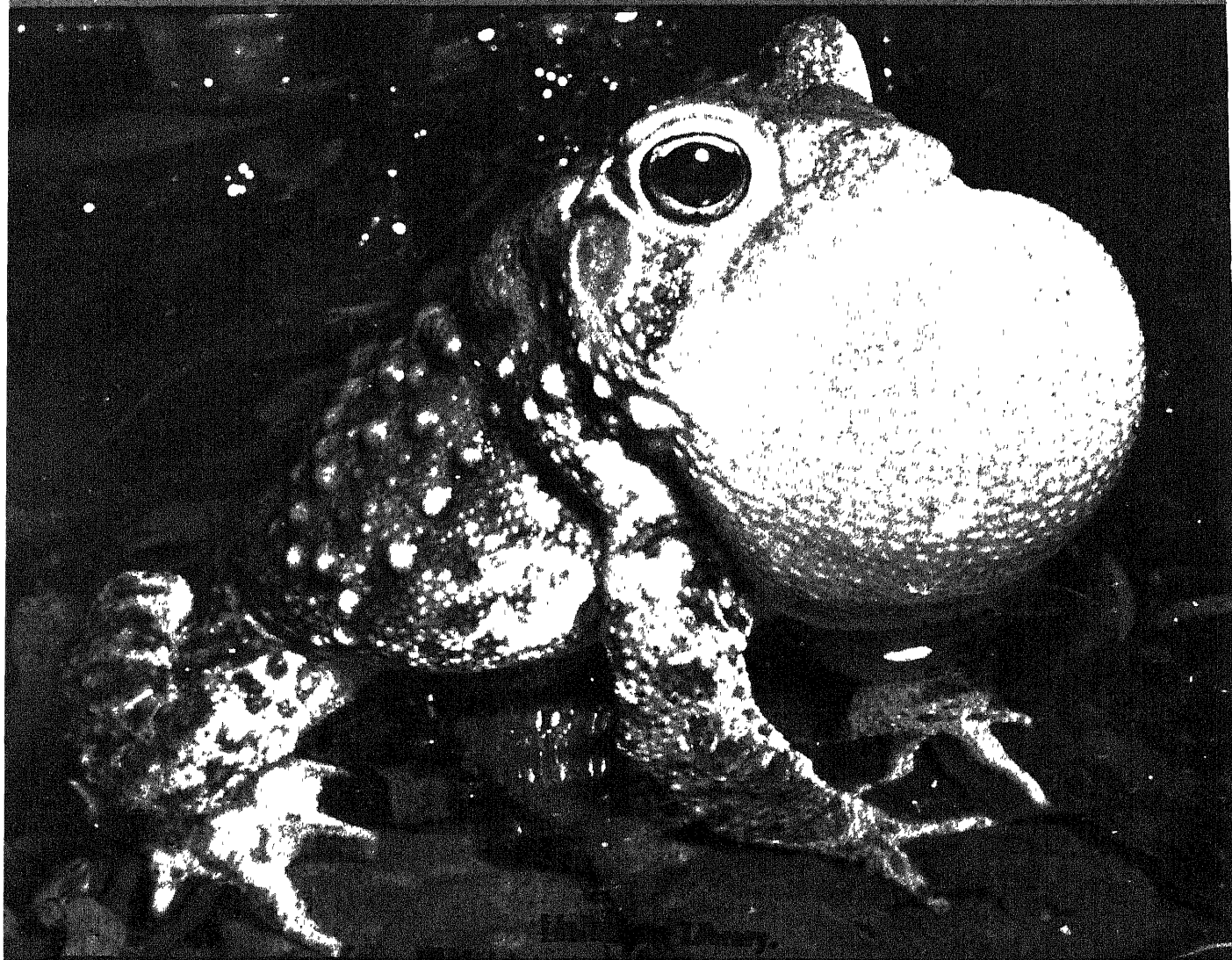
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SCIENCE NEWS LETTER



THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 7, 1945



Chanson d'Amour

See Page 216

A SCIENCE SERVICE PUBLICATION



The Electron Microscope reveals the fine details of human tooth canals (cross-section shown in background of photo above).

RCA Electron Microscope—a new tool for dentistry

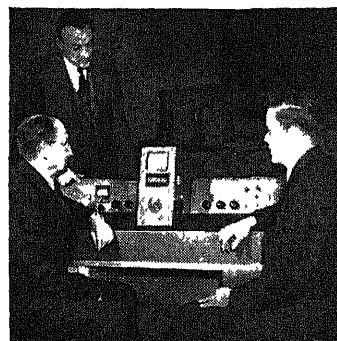
SEEN FOR THE FIRST TIME: the exquisite details of tooth canals! There are about 50 miles of canals or tubules in each human tooth! Yet never before could they be visualized so clearly for "close-up" examination of their tiniest details.

SEEN FOR THE FIRST TIME: entirely new tooth structures and surface irregularities, the very existence of which had until now been in doubt!

HOW SEEN?—through the RCA Electron Microscope, developed and perfected at RCA Laboratories. This Electron Microscope—with useful magnification up to 100,000 diameters and more—is a most efficient new tool for dental science—and one that promises to lay open the innermost hidden secrets of tooth structure and composition.

Besides aiding dentistry, the RCA Electron Microscope is already serving 27 different fields of science and industry.

Such research, as resulted in the Electron Microscope, goes into all RCA products. When you buy an RCA radio or television receiver, or a Victrola—made exclusively by RCA Victor—you get the greatest satisfaction... enjoy a unique pride of ownership. For if it's an RCA, you can rest assured it is one of the finest instruments of its kind that science has achieved.



Dr. V. K. Zworykin (seated at left), Associate Research Director of RCA Laboratories, with Perry Smith (standing) and Dr. James Hillier at a portable type desk model of the RCA Electron Microscope—the new tool for modern science and industry.

RADIO CORPORATION of AMERICA

PIONEERS IN PROGRESS



ENGINEERING

New Type Locomotives

New powerful high-speed coal-burning steam turbine engine has been designed. The cab and boiler section is between coal and water compartments.

➤ A NEW type of steam turbine locomotive, a coal-burner with great power and high speed, has been designed in an unusual arrangement having its coal compartment at the forward end, a combination cab and boiler section, with the smokestack at its rear, for its central part, and a water compartment following. The coal and the cab-boiler sections are supported by a single cast-steel frame mounted on two swiveling trucks, one under the coal compartment and the other under the boiler. Behind the boiler is coupled the water compartment.

This new turbine locomotive, which will be known as the "Triplex", is a development of the Pennsylvania Railroad, which recently put into service the first direct-drive steam turbine locomotive built in this country. The Triplex is approximately 137 feet in length, with a wheel base of 122 feet, but because of its swiveling trucks will be able to operate around any curve that a standard passenger car can negotiate.

The new locomotive, like the steam turbine already in use, does not have the familiar piston rods and other reciprocating parts of the conventional steam engine. This makes it possible to use smaller driving wheels, which permits larger boiler capacity for the same road clearances, and improves the locomotive's efficiency.

A unique feature, to maintain weight in the coal compartment over its driving wheels as coal is consumed, is an arrangement by which water from the water compartment automatically flows to a tank in the coal compartment, and returns to the water tender automatically when a new supply of coal is taken on. Mounting the coal compartment on the same frame as the boiler keeps alignment between the boiler and the coal pile and thus simplifies the operation of the mechanical stoker.

An electrically driven locomotive powered by a coal-burning steam turbine engine has been designed, and three of them will soon be constructed for the Chesapeake and Ohio Railway by the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing

Company. No electrically driven locomotive powered by steam turbine is in operation in the United States at the present time.

In the new locomotive, in a single self-contained unit, the coal is carried in the head instead of in a tender, the engineer's cab is next, then the boiler, and last the electric motors that drive the wheels. The engine is designed to develop 6,000 horsepower and the locomotive will be capable of running more than 100 miles an hour under full load even on grades. Smoothness of operation is one of the results fully expected.

Science News Letter, April 7, 1945

GENERAL SCIENCE

Franklin Medal Will Go to Dr. Harlow Shapley

➤ The FRANKLIN medal, the highest award of the Franklin Institute, will be presented to Dr. Harlow Shapley, director of the Harvard College Observatory, at the Medal Day dinner on April 18. The award is made for his valuable contributions to the science of astronomy, and especially for his work "in the measurement of the vast distances necessary for the determination of the nature and extent of our galaxy, as well as those of other galaxies external to ours."

Walter J. Coppock of Moyland, Pa., and Greer Ellis of Chicago will receive Franklin Institute certificates of merit at the same dinner. Mr. Coppock de-

signed a novel and theoretically sound motor base which gives automatic belt tension under varying load conditions, and Mr. Ellis developed brittle lacquers for strain measurement and a technique for their use.

Science News Letter, April 7, 1945

EDUCATION

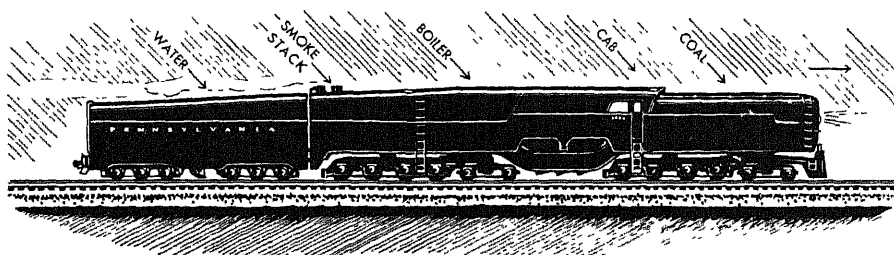
Rockefeller Grant for Postwar Graduate Degrees

➤ WAR RESEARCH workers in and out of uniform will be able to go back to graduate school through a Rockefeller Foundation grant of \$335,000 to the National Research Council, recently announced.

This temporary, nation-wide program for postwar pre-doctoral fellowships is intended to encourage resumption of graduate study in the natural sciences by those who had to interrupt their education to engage in war work. The money value of the fellowships will be sufficient so that those given them will be able to devote essentially full time to working for their Ph.D. degrees.

"The almost complete cessation of consecutive professional training which has occurred in scientific fields will make impossible for some time the normal accession of additional highly trained personnel," the announcement explained. "These losses, in the face of sharply increasing demands for such personnel, will inevitably retard to the danger point the resumption of scientific progress after the war. The resulting handicap to postwar industrial recovery, public health, and military security is a matter of national concern."

This program as announced is intended to help alleviate the very serious set-back to American scientific competence resulting from the war's interference with normal educational processes.



THE "TRIPLEX"—This ultra-powerful type of steam turbine locomotive has been designed by the Pennsylvania Railroad for fast, heavy duty freight and passenger service. Coal will be carried in the front, shown to the right of the picture, and water supply in the rear. The cab will be ahead of boiler and smoke stack, reversing the usual order.

Although the program will not be inaugurated immediately, it is being announced now so that those in war work will stay on their war research jobs without fear that they may not be able to continue their graduate training later.

The new program will be able to fur-

nish assistance to only a fraction of all graduate students. It is planned so as not to divert to full time study those who in the postwar year will be needed part-time to help teach in over-burdened colleges and universities.

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ahead of the cockpit by tubular struts extending from the forward end of the box container.

The Barracuda carries two pairs of rockets attached beneath the wing on either side of the fuselage, with the rocket tubes extending well beyond the trailing edge. Swordfish require only two rockets to lift them from the deck.

Science News Letter, April 7, 1945

AERONAUTICS

Take-Offs in 4 Seconds

"Rato" puts airplanes into the air in record-breaking short time, only 200 feet from starting point on the deck of carriers. Long runways may be thing of the past.

► BRITISH naval planes literally leap from the decks of the Royal Navy's aircraft carriers these days. The secret is new and powerful rockets that can put planes in the air in four seconds after a run of only 200 feet from a dead start. Only recently developed through the co-operative efforts of British government and industry, rocket-assisted take-off will probably soon be nicknamed "RATO", since it is a close relative to jet-assisted take-off, commonly called "JATO."

Unlike JATO, which is now used to lift the weight of heavy flying boats off the water during take-off, RATO is a successful solution to the problem of reducing take-off time and distance which has puzzled aeronautical engineers for years. In a detailed description of rocket assisted take-off, published in *Flight* magazine, C. B. Bailey-Watson predicts that RATO will do away with the long airport runways, which it is now believed tomorrow's giants of the sky must have.

In using RATO, a rocket firing point is plainly marked on the carrier deck several feet ahead of the point where the take-off run begins. The actual footage in many cases is around 100 feet but it varies with the weight of the plane and the velocity of prevailing winds. When ready, the pilot moves his plane down the deck of the flat-top exactly as he would do in making an unassisted take-off. The moment he comes abreast of the rocket firing marker, he presses an electric button in the cockpit. This sets off two to four rockets. Split seconds later he is in the air, where he proceeds to jettison the spent rocket tubes before setting out on his mission.

Weighing 66 pounds, each standard RATO rocket consists of a cold-drawn steel tube with a wall about as thick as a pie crust, 41 inches long, and five inches in diameter. This tube is loaded with 26

pounds of cordite, a smokeless powder, used as the propellant charge. In operation, the gases generated by the rapidly burning cordite after it is fired are expelled at high velocity through a venturi tube incorporating a four-inch nozzle.

RATO equipment is constructed so that when the airplane takes to the air four seconds after the rockets are fired the propellant charge is completely consumed, and the tubes can be dropped. If the tubes were not jettisoned they would interfere with the speed and efficient operation of the plane. The maximum thrust of the rockets is developed about a tenth of a second after firing. The mean thrust developed by the rockets is about 4,400 pounds. This almost equals the thrust produced by several high-horsepower airplane engines.

RATO rockets produce no flame, and very little smoke during the take-off, although an onlooker will hear a loud crack, like the snap of a whip, when the rockets are set off electrically, and a very little flame can be seen from their nozzles just before the propellant charge is exhausted.

In the United States, naval aircraft are using rocket-assisted take-off equipment, Mr. Bailey-Watson stated, but did not explore the matter further. Following a successful experimental installation of RATO on a Vought-Sikorsky Chesapeake, the British adapted it for use on the single-engine carrier-based Seafire, Swordfish, and Barracuda planes.

The Seafire uses two rockets mounted in a box container on the top of each wing near the fuselage; four rockets in all. The rockets are set at such an angle that their lines of thrust pass near the plane's center of gravity, and so that the hot rocket gases cannot damage the airplane tail structure. The rocket mechanisms are attached to the fuselage just

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MEDICINE

Penicillin Price Drops

Since the March 15 general release for civilian use, the cost of the drug has dropped from \$2.40 per 100,000 Oxford units to as low as \$1.54 per 100,000 units.

► THE COST of being sick, when the illness is one that responds to penicillin, is going down.

The price of the drug itself has dropped, since the March 15 general release for civilian use, from \$2.40 per 100,000 Oxford units to as low as \$1.54 per 100,000 units. This last figure is a wholesale price and the price to a physician may be \$1.80 to \$2.00 per 100,000 units.

This amount, 100,000 Oxford units, is enough to cure one case of gonorrhea. Most other illnesses require considerably more of the drug, depending on how early treatment is started and how severe the illness is. For syphilis two to four million units may be required. For osteomyelitis, a bone infection that is usually long drawn-out, as much as five million units may be needed. From 500,000 to 1,000,000 units are required for most illnesses in which penicillin is the drug of choice.

The price of sulfa drugs, which can be used for some of the same conditions as penicillin, is less than the price of penicillin. The cost of getting well may be cheaper when penicillin can be used, however, because recovery is quicker. This means less time in the hospital, a smaller bill for the hospital room or bed, and a quicker return to work and earning.

Sulfa drug treatment, however, can sometimes be given at home. The patient does not have to be stuck with a hypodermic needle every three or four hours day and night, as he does when undergoing penicillin treatment. The method of giving penicillin requires more visits by the doctor or more nursing attendance, which is likely to be reflected in the total cost of the illness.

The reasons for the low and possibly still lower cost of penicillin are competition and increased production. Production took a big jump in February, just before the drug was released for civilian use generally. The production increase is expected to continue, so it is reasonable to suppose the price will continue to drop.

The OPA ceiling of \$10 per 100,000 units has not been revised, partly because

of the drop in price and partly because of the time lag involved. It would take about two months for OPA to collect and analyze figures on which to set a new ceiling, by which time, if production continued to increase, the price would again be lower.

How cheap penicillin will ultimately become will depend upon the cost of manufacture as methods improve and upon trade conditions.

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CHEMISTRY

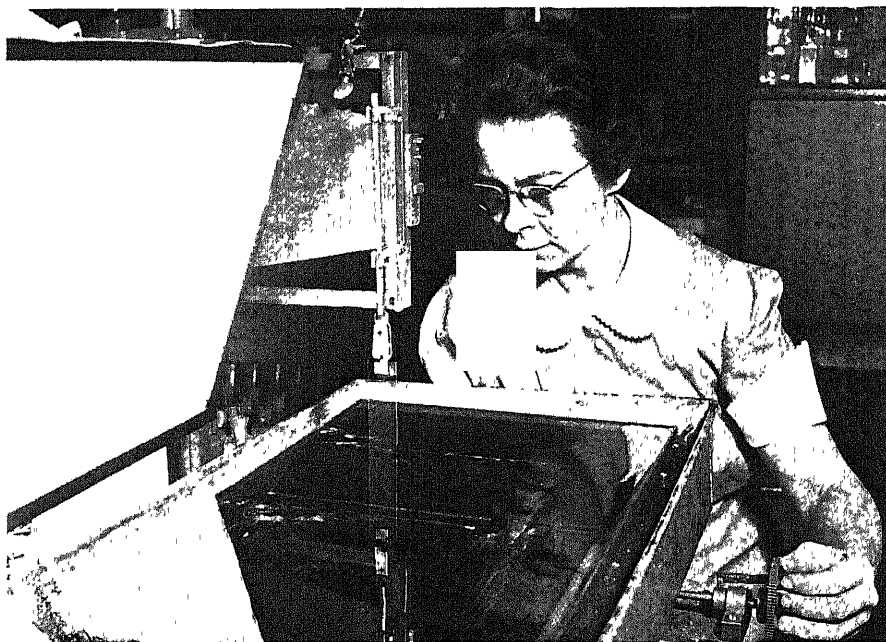
Invisible Glass Wins Award for Dr. Blodgett

► THE AMERICAN Association of University Women announced that the annual Achievement Award of \$2,500 goes to Dr. Katharine B. Blodgett of General Electric Research Laboratory at Schenectady, N. Y., for her work on building films of almost infinitesimal thickness.

Dr. Blodgett's invention of "invisible glass" has received widespread public recognition, but this is only a by-product of her long-time research, the awards committee pointed out. It was during her study of methods of building films, frequently only one molecule thick, that she developed a process of depositing a non-reflective film on glass. Her study of two-dimensional films, with a total thickness only one-quarter of a wavelength of light, has contributed to the efficiency of the lenses of submarine periscopes and aerial cameras by preventing wasteful loss of light through reflection. Another application of her work on molecular films is a gauge she devised for measuring, by light reflection, the thickness of any transparent or semi-transparent substance within a range of one- to twenty-millionths of an inch.

"Anyone who wishes to measure the thickness of a film which is only a few millionths of an inch thick can compare the color of his film with the series of colors in the gauge. The step on the gauge that matches his film in color will give him a measure of its thickness," Dr. Blodgett said at the meeting.

Dr. Blodgett received the award at ceremonies held on March 29 at the National Museum in Washington, D. C. This is the third year that the Achieve-



"BUILT-UP" FILM—Dr. Blodgett, working in her laboratory at the General Electric Company, is building the thin films, which afford scientists a valuable thickness gauge, by dipping them in and out of the water. The crank in her left hand raises and lowers the glass which holds the film.

ment Award, contributed annually by the Northwest Central Region of the AAUW, has been presented to an out-

standing woman scholar in recognition of distinguished achievement.

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METALLURGY

Future of Light Metals

Postwar uses of aluminum and magnesium may require heavy production. Heavy metals may be replaced where weight is not essential.

➤ ALUMINUM and magnesium, often called "Al and Mag" for short, and also the "magic" metals, have had their day in Congress at hearings before the Senate Small Business Committee, which is considering, among other matters, the future of these light metals and what to do about the government's investment of over a billion dollars in plants for their production.

Producers of these light metals, and users extending from aircraft manufacturers to kitchen utensil fabricators, were heard. Representatives of heavy industries, such as builders of automobiles, railroad cars, and farm machinery, presented opinions of their possible future uses in their industries by invitation of the committee.

Aluminum naval destroyers able to travel at 60 knots, as well as magnesium truck and trailer bodies, were predicted by Henry A. Kaiser, the shipbuilder, who stated that plans for the destroyer are already complete and that magnesium-bodied trucks are now on the road. These bodies cost twice as much as bodies of steel, but, on those now in use by one of his companies, can haul four tons more payload. He suggested that the government plants be leased or sold to private companies.

The supply of magnesium in the United States is limitless, declared Dr. Willard H. Dow, head of the Dow Chemical Company. The only limit is the amount of electricity available for its production. Magnesium as a metal, he said, has been known for more than a century, but only for about 25 years has it developed as a structural material. Then it was found that if other metals are mixed with magnesium in various proportions, the alloy gives magnesium a new character and it becomes a tough, easily machined, corrosion-resisting metal in every way suitable for construction in which light weight matters. He suggested many possible uses, including aircraft, railroad equipment, automobile and truck bodies, furniture, shipping containers, machinery, home construction,

and in the oil industry, particularly to protect pipe lines from electrical deterioration.

Aluminum production by the Reynolds Metals Company, which up until 1941 was a fabricator, not a producer of this metal, was discussed by R. S. Reynolds, president of the company. The possibilities in the future for aluminum are enormous, he said, but so are the problems. "If the government adopts sound policies for the disposal of its own plants and for their subsequent operation, real dividends in jobs and consumer goods will be produced."

On the question of the policy to be adopted in the disposition of government-owned aluminum plants, I. W. Wilson, of the Aluminum Company of America, declared that laying down a hard-and-fast rule at this time would be an unwise step for Congress to take. No one can now tell the length of time that will be required to develop postwar aluminum markets.

"A year after peace has been made," he said, "Congress and the industry will be better able to gauge the future; two years after peace they may be still better able to judge the future."

He referred to the possibilities of the use of vast quantities of light metals in the construction of naval vessels, passenger and cargo ships. He submitted a list of 2,000 items in which aluminum was or could be used to advantage.

Light Metals in Aviation

➤ ADOPTION of a national air power policy for the development of postwar military and civilian aviation is necessary to assure realization of present promising opportunities for the light metals in the aircraft field, Eugene E. Wilson, president of the Aeronautical Chamber of Commerce, told the committee.

"The future of air transport, civil and military, is more dependent upon light metals than that of any other industry," he said. "The extent of the postwar de-

mand for light metals from the aircraft manufacturers cannot be foretold because the volume of postwar production of military and commercial planes largely depends upon public policy, which Congress must determine."

There will be little change in the relative quantities of steel, iron, aluminum and magnesium in civilian postwar cars as compared with the ratios established in prewar production, according to J. S. Laird of the Ford Motor Company. Magnesium is unsuitable for more than a few of the many items which make up an automobile, and its use is ruled out for engine parts which are highly stressed, or must be wear-resistant, as well as for water-cooled cylinder blocks and heads, he stated. Aluminum castings have been used successfully, he continued, in cylinder blocks, cylinder heads, oil pans, pistons, timing gears and housing.

"Wheel type and tracklaying tractors for farm or industrial uses depend largely upon their weight to develop satisfactory draw-bar power," declared A. W. Scarrott of the International Harvester Company at one of the hearings. Tillage and harvesting machines, such as plows, harrows and mowers, also require weight, so that no appreciable use of the light metals may be expected in these machines, he said, and their use will be confined to relatively few parts.

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GENETICS

Multiple Births More Frequent Among Negroes

➤ WHEN the stork carries a double burden he is more likely to set it down in a Negro home than among whites, analysis of U. S. birth registration data revealed to Prof. Herluf H. Strandskov, of the University of Chicago.

Quadruplets, very rare among white births, occur more than twice as often among the Negroes, Prof. Strandskov found. There are four babies born at the same time to white mothers only once in every 570,196 confinements. Quadruplets are born to Negro mothers once in every 237,897 confinements.

For triplets the figures are one set for each 9,182 confinements for whites; one in 5,076 for Negroes. Twins come once in 88 or 89 confinements for whites; 1 in 70 for Negroes. The average for all races in the United States is 1 in 86.

The findings on the difference in frequency of multiple births among different races are reported in the *American Journal of Physical Anthropology*, (March).

Science News Letter, April 7, 1945

COMMUNICATIONS

Microwave Radio Relay

This method of transmission of long distance phone calls, television and sound will get a chance to prove its worth in New York to Boston tests.

► CAST in the role of guinea pigs, New York and Boston will co-star in a proposed elaborate test to determine the efficiency and economy of microwave radio relay for the transmission of long-distance telephone calls and sound and television broadcast programs, as compared with transmission over wires and cables. The two cities were selected on the basis of the need for additional communications facilities linking them.

With approval granted for terminal stations at New York and Boston, the American Telephone and Telegraph Company has made application to the Federal Communications Commission for authority to construct seven relay stations joining terminals. These relay stations, consisting of transmitters and receivers connected to highly directive antenna systems, will pick up and amplify the radio waves and beam them on to the next station where the process will be duplicated until a terminal is reached.

The FCC has been asked to allocate

eight channels for the tests in the microwave part of the radio spectrum, to provide two simultaneous transmissions in each direction. For the present, and until the completion of experiments, the proposed facilities will not be available for commercial use.

Reception in the microwave region of the radio spectrum is very satisfactory since there is almost no static or fading. The highly directive antennae can concentrate the energy in a narrow beam, thereby increasing the signal strength. If the tests are a success, the relay network may be spread out in all directions to provide radio relay communications to nearby cities and towns. Due to the fact that microwaves do not travel much beyond the horizon, the same set of frequencies can be used over and over again at alternate relay stations.

Since communication is not possible much below the line of sight in the microwave region of the spectrum, sites for the relay stations were chosen for

their elevation. The highest proposed station is 1,395 feet above sea level on Asnebumskit mountain in central Massachusetts. The lowest proposed relay station would be located on Bear Hill, Mass., with an elevation of 355 feet. The Bear Hill-to-Boston leg is about 11 miles, the shortest relay distance in the system. The longest legs in the system, both approximately 35 miles, extend from the New York terminal station atop the A. T. & T. Long Lines Building in lower Manhattan to Jackie Jones mountain (elevation 1,240 feet), north of New York City and west of the Hudson River; and from there to Birch Hill (elevation 1,330 feet), near Pawling, N. Y., and the Connecticut state line. The remaining three stations would be located on Spindle Hill (elevation 1,020 feet) between Waterbury and Hartford, Conn.; John Tom Hill (elevation 875 feet) near Glastonbury, Conn.; and Bald Hill (elevation 1,286 feet) close to the Connecticut-Massachusetts state line.

If commercial facilities are established satisfactorily as a result of these experiments, the microwave radio relay system may eventually be connected with the Bell Telephone coaxial cable that already connects New York and Washington. This would provide facilities for television, sound, and long distance telephone transmission from Boston to Washington. Later on, it might be connected to a nationwide coaxial cable network.

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NEW SUIT TESTED—These two men are floating "comfortably" on freezing water. The nylon suit was designed to protect the wearer from the initial shock of entering the cold water and decrease the effects of exposure from spray and wind when he is floating on an Emergency Rescue raft. (See SNL, Mar. 10.) Official U. S. Army Air Forces photograph.

BOTANY

Cork Oak Trees Planted In Honor of Servicemen

► MEMBERS of the Armed Forces from Moss Point, Miss., will have cork-oak trees growing in their honor on the high school campus. The cork-oak seedlings were planted there by the Science Club in February as part of the project conducted by Science Clubs of America to increase the cork supply of the United States, largest user in the world.

Cork, used in life belts and for thermal insulation, comes from the cork oak, which can be grown commercially in 23 states in the Union. Science Clubs located in these states, mostly in the South and Far West, are studying specimens of bark and leaves, pictures of the tree and the acorns, and details of planting and growing.

In Baltimore the Parent-Teachers Association has donated land for 4,000 seedlings.

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CHEMISTRY

Gas-Mask Filter From Short Cellulose Fibers

➤ STRAW and other farm wastes, even stalks of wayside weeds, can be put to good use in protecting the lives of our fighting men if cornered Axis forces finally resort to poison-gas warfare. Two U. S. Department of Agriculture chemists, Dr. E. C. Lathrop and S. I. Aronovsky, of the Northern Regional Research Laboratory at Peoria, Ill., have just been granted U. S. patent 2,372,437 on a gas-mask filter medium in which short cellulose fibers from straw and other neglected materials play an important part.

Long fibers of alpha cellulose, from wood pulp or cotton linters, are standard constituents of such filters, the two inventors explain. However, they require the addition of shorter fibers to increase their adsorbent capacity. Short asbestos fibers can be used, but these are difficult to separate out from the general mass of asbestos and hence are comparatively costly. This objection does not apply to the short, highly adsorbent fibers of alpha cellulose that can be obtained in abundance from straw and stalk materials.

Rights to manufacture and use the newly patented filter medium are assigned royalty-free to the government, through the Secretary of Agriculture.

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ANTHROPOLOGY

Scientists Disagree on Age of Ancient Skull

➤ HOW LONG has Australia had human inhabitants?

This question is being threshed out anew as a result of the discovery of a human skull in an undisturbed deposit estimated to be 50,000 years old, near Keilor, Australia. This would seem to give the skull an age of 500 centuries.

However, Dr. Franz Weidenreich of the American Museum of Natural History has made a careful examination of the specimen, and he states, in the *Journal of Physical Anthropology* (March), that this skull is very similar to another ancient Australian relic, known as the Wadjak skull, which was found in 1889, and which has a generally agreed-on age of only 20,000 years. If Dr. Weidenreich is correct in his identification of the Keilor skull as belonging to the Wadjak people, a really ancient human type is yet to be found in Australia.

A possible complication in the problem may arise from the fact that "modern" types of human skulls have been found

at apparently the same levels with undoubtedly ancient, primitive skulls, in other parts of the world. Could this mean that modern types evolved early, and perhaps at several different times? Dr. Weidenreich is inclined to think not. He feels that in such cases the dating is in error, and that more reliance can be placed on the skull type than on the geological level of burial.

Science News Letter, April 7, 1945

METALLURGY

Magnesium, Steel, Cement From the Same Minerals

➤ A PROCESS that yields magnesium, alloy steel and cement from the same operation is the subject of patent 2,372,571, issued to Dr. Fritz J. Hansgirg, Austrian-born metallurgical chemist who since 1940 has been in this country where, among other jobs, he aided Henry Kaiser in setting up his big magnesium plant at Permanente, Calif.

Dr. Hansgirg's new process is designed to make use of silica-containing ores of magnesium, such as serpentine, olivine, etc. The mineral is finely powdered, mixed with calcium carbide and compressed into tablets. These are heated in a retort, under vacuum. The magnesium is driven off as a vapor, which on cooling yields the metal in solid, pure form.

The slag or clinker contains fine particles of alloy steel, rich in chromium and titanium; sometimes iron ore must be added before processing, if the natural mineral does not contain enough iron. The steel particles are extracted with a magnetic separator, and the silicious residue goes to the cement mill.

Science News Letter, April 7, 1945

ZOOLOGY

American Toad Trills Love Song to Lady Friend**See Front Cover**

➤ THE AMERICAN TOAD lives in and around shallow ponds during the spring mating season. During this season he serenades his lady with one of the sweetest sounds that may be heard in the frog-pond chorus. While the toad is trilling his love song, he blows up his throat to immense proportions, as shown in the photograph by George A. Smith on the front cover of this SCIENCE NEWS LETTER. While in the water the toad has a beautiful caramel brown color, and an eye that classical writers have referred to as a precious jewel.

Science News Letter, April 7, 1945



CHEMISTRY

Shrinkage Controlled By a Melamine Resin

➤ WOOL CLOTH may be shrunk, and its shrinkage controlled, by the use of a melamine resin developed by the American Cyanamid Company which had an exhibit in New York of tailored suits made of wools treated under the new process. The melamine resin will be known as Lanaset, and the treated cloth cuts and drapes better, retains its original shape and can be laundered, it is claimed.

Lanaset stabilizes wool and wool blends without affecting the absorbency normally characteristic of wool. Other claims are that it reduces felting or matting of the wool upon laundering, and prevents pilling and fuzzing. It can be used also with blends of wool and rayon and in tropical worsteds for men's suits. It is now available for practical trials.

Science News Letter, April 7, 1945

MEDICINE

Speech Defects Increase, Ascribed to War Strain

➤ A WAR-CAUSED increase in the number of persons who stutter or suffer from other speech defects appears in the records of the National Hospital for Speech Disorders, according to the annual report by its medical director, Dr. James Sonnett Greene.

A total of 3,749 patients, the largest since the start of the hospital 29 years ago, and 800 more than the previous year, were treated during the past year, Dr. Greene reports.

The added emotional strains and conflicts brought on by wartime conditions explain the increase in Dr. Greene's opinion. Many of the patients were servicemen and ex-servicemen with speech disorders that developed under the strain of military service or had been aggravated by it.

A large proportion of these men were treated without charge. The Government is now arranging, Dr. Greene reports, a contract with the hospital under which it will assume the financial responsibility of rehabilitating veterans referred to the institution for treatment.

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E FIELDS

CHEMISTRY

Silicone Can Withstand Extreme Temperatures

➤ A SAND-BASED silicone, a new elastic electrical insulating enamel that will withstand continuous operation at 500 degrees Fahrenheit followed by sudden plunges into icy sea water, is the latest silicone material to be produced commercially and is to be used in the insulation of resistors that control the current fed into war radar, radio and other electronic essential equipment. It is produced by the Dow Corning Corporation.

The new silicone, which will be known as Silastic, is a rubbery, white salve-like material, that can be applied by dipping and cured at from 500 to 550 degrees Fahrenheit. In addition to passing tests for thermal shock endurance, it is waterproof, and can withstand immersion in boiling water as well as in ice water. Applied to glass cloth and tape, this coating produces a heat-resistant electrical wrapping material, and may be used in other applications to exclude moisture from electrical equipment.

Science News Letter, April 7, 1945

PUBLIC HEALTH

More Than 16 Million Entered Hospitals in 1944

➤ AMERICANS entered hospitals as patients at the rate of one person about every two seconds last year, not counting the babies who were born in hospitals at the rate of one live baby every 16.4 seconds, the American Medical Association's 24th annual hospital census shows. (*Journal, American Medical Association*, Mar. 31)

The 16,036,848 admissions to hospitals, exclusive of outpatients and newborn infants, is called "unprecedented" by Dr. F. H. Arestad and Dr. M. G. Westmoreland, in their report of the facts and figures on hospitals.

About one-fourth of these admissions, 4,287,271, were to federal hospitals and 2,257,949 to other governmental institutions.

The number of registered hospitals decreased to 6,611, which is 44 less than for 1943, but the number of beds increased to a total of 1,729,945.

In contrast to the feeling some patients

may have had that they were being hustled out of the hospital pretty fast to make room for the next patient, is the figure showing that in general hospitals the average length of stay per patient increased by one-half day.

Of the 1,919,976 babies born in hospitals last year, 96.7% were born in general hospitals, with only 3.2% born in maternity hospitals and 0.1% in other institutions. The number of babies born in hospitals has tripled in 15 years.

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ICHTHYOLOGY

Pickarel Caught Are Often Below Legal Length

➤ THREE out of every five Eastern pickarel caught by sportsmen have to be thrown back into the water because they are shorter than the legal 12 inches, if those caught in a 200-acre pond near East Haddam, Conn., are typical.

Over 1200 fish were caught by rod and line for tagging, fin-clipping and life-history data in the summers of 1940 and 1941 as part of a cooperative project between the East Haddam Fish and Game Club and the Department of Forestry and Wild-life Management, University of Connecticut. About 64% of all the fish caught were less than the minimum legal length, Leonard E. Foote and Bradford P. Blake of the University of Connecticut report. (*Journal of Wildlife Management*, April)

There were approximately 60 pickarel per acre, and an average of three of these excellent game fish were caught each hour the sportsmen fished. They ranged in length from six to 22 inches. The smaller fish fed almost entirely upon insects while the larger ones enjoyed a bill-of-fare composed largely of fish.

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HORTICULTURE

Tree Bears Fruit From January Until May

➤ ONLY ONE plant patent was issued last week, as contrasted with 473 "regular" patents. This plant patent, No. 656, is on a subtropical fruit tree, as yet unfamiliar to most Americans, the cherimoya. According to the statement of its breeder, William H. Ott of Whittier, Calif., this tree bears fruit continuously from January until May, and the fruit is better adapted for commercial handling and shipping than the varieties hitherto grown.

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MEDICINE

Protective Cream Given G.I.'s Using Bazookas

➤ SOLDIERS using bazookas and flame-throwers, as well as tank crews, are protected against flashburns by a new cream issued to them by the Quartermaster Corps. Its prime function is to provide a "fireproof" protection for exposed parts of the body against burns from sudden flashes of flame. As such, it will probably be made available after the war to community fire departments for the protection of its fire fighters.

The cream, which comes in a pocket-size container, does not possess any medical properties and will not cure burns. It was originally developed for the use of Navy gun crews by the Naval Research Medical Institute, and has only recently been adopted by the Army.

The cream is applied in the same way as a woman's beauty mask, just heavily enough so that the skin does not show through. It will dry in about five minutes. Rain, perspiration, or friction tend to remove the cream. It can be rapidly removed with soap and water.

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MEDICINE

Medical Officers Want To Become Specialists

➤ A LARGE percentage of doctors now on duty with the Army, Navy, Public Health Service and Veterans Administration want six months or more of further training in hospital or other educational work and want to qualify as specialists in some branch of medicine after the war. These desires were expressed in answer to a questionnaire sent to each medical officer. The results are reported by Lieut. Col. Harold C. Lueth, Surgeon General's liaison officer. (*Journal, American Medical Association*, Mar. 31)

More than 35% of all medical officers on duty are represented in the questionnaires studied. Of these, nearly 60% want to take six months or longer courses and 63% want to become certified specialists.

The 10 most popular fields in which long courses of further training are wanted are, in order of frequency of request: surgery, internal medicine, obstetrics and gynecology, general review, psychiatry and neurology, pediatrics, orthopedic surgery, ophthalmology, radiology and otolaryngology.

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MEDICINE

Play That Heals

Making belts, bowls, and vases helps the war wounded recover. Intensive course has been set up to train occupational therapists.

By MARTHA G. MORROW

➤ THESE MEN were not long ago slinging bazooka shells at Heinies. They are now using saws instead of machetes and making pocketbooks for the girl friend instead of booby traps for the Japs.

But these soldiers and sailors are still fighting this war, don't you forget it. They are fighting their way back to normal living in Army and Navy hospitals. Each activity is done on doctor's orders, just as much as swallowing the pills that he sometimes prescribes.

Handkerchief tricks, games of balancing sticks, making loosely-jointed toys dance, and even stretching a thick rubber band all help the men exercise stiff muscles as well as keeping amused both the player and the buddy in the next bed.

Men in one hospital are weaving rugs or printing a hospital newspaper because the muscles of their back, shoulder or hand have become stiff from injury or lack of use. In other hospitals soldiers and sailors will be found making men's belts or printing record cards, not so much because of physical injuries, but because they cracked under the strain of war and need something to arouse their interest and ambition.

Occupational therapy is taking a prominent part in the great program of reconditioning and rehabilitation which the Army and Navy have undertaken so that wounded men can be returned to active duty or civilian life in the best possible condition. As in the best schools of education, so reeducation for servicemen is often fun.

Learning To Do Without

Simple games, such as chess, and ping pong, when played with an understanding partner, teach a man to do things for himself now that a hook or artificial leg is pinch-hitting for his arm or leg lost in combat. Learning to tie a shoe string or type on a typewriter helps a blinded serviceman learn to adjust himself to a world without light.

Book-ends can be made from soft wood, billfolds from pliable leather, and vases molded from oozy clay—the men

can choose so long as the work fills the doctor's prescription. Your friend with the injured arm, for instance, can probably take his choice between the loom and the printing press.

But just in case it hurts him to raise his arm as high as he should and he plans to "cheat" a little, a board placed across the loom forces him to reach above it to complete the pattern he is weaving. A table elevated to shoulder level makes another patient exercise his back and shoulder while making that what-not for the breakfast nook back home.

A man who has had a shell fragment wound in his forearm, damaging the nerves, muscles and tendons controlling his hand, will often find after the wound has healed that the hand is stiff and almost useless. Directed exercise, gradually increasing in strenuousness, may restore its strength and mobility. The doctor therefore writes a prescription specifying the type of injury and muscles which should be treated.

The serviceman may find an interest in clay modeling, the soft material offering the light exertion good for his weakened fingers in the early stages of reconditioning. Or he may want to build a telegraph set of his own, later sending messages on his own machine. If knotting strong thread is more to his liking, belts and suspenders which he can wear or send as gifts will keep him mentally alert as well as exercise his weakened hand and wrist.

As his hands get stronger and he can begin to close them, woodworking and carpentry may attract the serviceman's attention. Tools equipped with built-up handles, large enough to fit the half-closed hand, are furnished him at first. As he works, he becomes able to close his hand more and more until he can use regular tools and finally recovers the power to grasp any object.

Early use is made of occupational therapy so that bed patients may regain the use of injured parts. Work tables have been devised so that men can carve book ends and fancy boxes while still in bed, and miniature looms permit them to weave almost as soon as they are able to sit up.



GOOD EXERCISE—The partially paralyzed nerves which innervate the muscles of this soldier's hand and wrist are used in weaving a man's belt. Photographs by Fremont Davis, Science Service staff photographer.

The bicycle jigsaw to restore motion to injured legs, and jobs requiring such heavy equipment as metal work and printing, must wait until the patient is able to be up and around.

Although the teaching of major skills to the patients is not a major objective, frequently the men discover through their work abilities and talents which they never dreamed they possessed. Many hobbies have been developed and new lines of work first begun in this way.

Outgrowth of Last War

Occupational therapy is an outgrowth of the last war. From his post in France, General Pershing requested 200 "reconstruction aids" to keep the minds of the patients off their illnesses. After a short 12-week course in crafts and diversional type recreational work, these aids were assigned to Army hospitals.

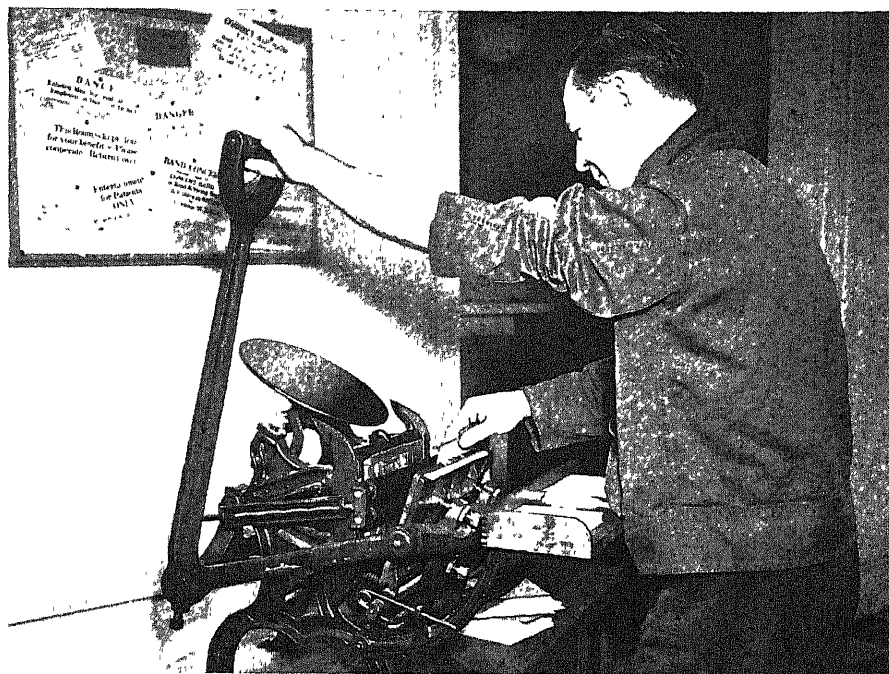
Today more comprehensive courses are offered, accredited schools giving a three to five-year course to girls interested in doing things with their hands and having a real desire to help persons suffering from physical or mental illness.

In both the Army and Navy, occupational therapy is one phase of the reconditioning and rehabilitation program. Occupational therapists serve the Army as civilians; in the Navy they are commissioned in the WAVES. Because there is a shortage of trained personnel, accelerated programs have been instituted in both branches of the service.

Students from approved schools who have mastered the theory of occupational therapy may receive their clinical training as officers in Naval hospitals, reports Lt. (j. g.) Lois Brownell, occupational therapy adviser to the Medical Department. Enlisted men and women of the Navy Hospital Corps can qualify after a three-month hospital course in theory and practice as assistants to occupational therapy officers.

An intensive war emergency course has been authorized by the War Department under the Civil Service Commission, states Mrs. Winifred Kahmann, chief of the Occupational Therapy branch of the Army. The course offers college graduates with special qualifications four months of medical subjects and theory of occupational therapy, followed by eight months of clinical practice in an Army hospital, all at government expense.

Tact, initiative, interest in medical studies and an adaptable personality are all needed for a person to be successful in this line of work. With all the resources of the hospital at his disposal as well as



ARM USEFUL AGAIN—Printing signs and record cards on the printing press at Walter Reed General Hospital aids the soldier to regain the use of his arm and fingers, a bullet having shattered the bone from his left elbow to wrist.

a well-equipped therapy shop, it is up to the occupational therapist to devise ways of getting the patient to fill the

doctor's prescription while doing something that holds his interest.

Science News Letter, April 7, 1945

RESEARCH

Researches Summarized

➤ RESEARCHES on a hundred far-flung fronts, with quicker victory and pleasanter peacetime life as twin goals, are summarized in the annual report of the Mellon Institute, handed to his board of trustees by Director E. R. Weidlein. The Institute's hundred-fold scientific activity is no mere figure of speech: to be quite exact, 101 research tasks are on the schedule; 94 of them actively pursued during the fiscal year just closed, and seven that have had to be suspended for the duration.

Direct contributions to the war effort, in addition to the researches on shells and rockets, include some exciting new synthetic lubricants, on which some details have to be withheld for security reasons. One of them seems to be a member of the group known as the silicones, that, like oils, are organic compounds containing carbon, but differ in that silicon atoms are substituted for part of the carbon atoms. Other synthetic lubricants are

more conventional in their makeup, but are unusual in that they do not become too "thick" in high-altitude cold or too "thin" in tropic heat, so that they can be used in such critical mechanisms as aviation gauges and flyers' wrist watches.

Other new things, useful now for war and even more useful soon in peace, include magnesium alloys, a synthetic "sand" made of ethyl silicate for making molds for fine castings, an unusual plastic material known as vinyl naphthalene, and new kinds of finely pulverized metal for use in powder metallurgy. The latter include manganese, steel and copper powders.

Research items of direct usefulness in the home include textiles with stress on the cost-of-living angle, other textiles with improved water-repellent properties, a new insecticide that may become a competitor for DDT in its deadliness to flies, and strained green soybeans for the baby.

Science News Letter, April 7, 1945

Do You Know?

The *Argentine* is now the second largest producer of vitamin A, ranking next to the United States; shark livers are the source.

The mineral *tourmaline* can be used for wavelength control in radio transmission but it is rarer and more expensive than quartz.

A single wide *tire* on heavy trucks and tractors has been found to be more efficient on soft ground and in mud than dual tires.

The world production of *plastics*, now replacing metals as a war measure, is only about one-quarter of one per cent the output of steel.

The fuzz from *cattails*, now used as a substitute for kapok in sound and heat insulation, has about 90% the warmth of the same amount of wool.

The *wood rat*, unlike the common rat, lives in the clean, open air of the country, usually in mountainous sections, with a home in a tiny cave; to scientists he is *Neotoma magister*.

Experiments on *birds* showed that the depth of the color of the yolk was related to the amount of greens fed, and a diet of white corn with no greens produced very pale-yolked eggs.

Lawns should not be *mowed* too often or too short during hot dry weather, but should be cut often enough to prevent certain aggressive weeds from forming seeds.

The hungry-looking *coyote* shot by predatory animal hunters may yield from five to seven pounds of fat usable for manufacturing munitions; the government has asked all hunters to save this fat.

The principal chemical elements held in *seawater*, mostly in the form of soluble salts, are chlorine, sodium, magnesium, calcium, potassium, bromine, boron, and fluorine; many others are found in very small quantities.

New glass *lenses* that enable pilots to detect targets obscured by haze are made of a glass composition which absorbs scattered blue light rays characteristic of haze; they are a warm rose smoke in tint.

ENGINEERING

Shortage Relieved

The manpower shortage is being helped, at least in part, through research and experimentation designed to increase war production with existing equipment.

► THE NATION'S manpower shortage is being relieved, at least in part, through scientific research and experimentation designed to increase war production with existing manpower and equipment, reports Richard B. Smith, executive secretary of the Manufacturing Engineering Committee of the American Society of Mechanical Engineers. This committee, created at the request of the War Production Board through the Office of Production Research and Development, has carried out at least 40 research projects during the past year, which has increased production rates as much as 1,000%.

The Committee's help is available to any war production agency for consultation about production and mechanical process problems, and it has aided industry in adopting more efficient production methods by formal research and through surveys.

Machine shops all over the country have been helped to increase machine speeds and lower costs, through information released by the Committee about high-speed milling. Data sheets, distributed to industry, outline jobs in actual operation and contain information that can be immediately applied in the shops to improve and speed up existing equipment without increasing manpower.

One project on high-speed milling is now being carried out at the California Institute of Technology under the supervision of the committee. Aircraft plants have been helped to meet their quotas for many thousands of military planes by information discovered through research. For example, speeds as high as 24,000 feet per minute are possible in machines cutting aluminum, instead of 2,000 to 3,000 feet per minute formerly thought to be satisfactory. It was also found that feeds of 200 to 300 inches per minute could be used instead of 15 or 20. In a few months such milling machines as the research had demonstrated to be practical were installed in aircraft plants.

Through the findings of the committee, one company which would have been called upon to spend \$10,000,000 met its quota of planes with less than 15 addi-

tional machines and fewer than 25 new skilled workers, at a cost of less than \$500,000.

Another project now being conducted is an investigation of fused quartz. Research has succeeded in producing a clear quartz practically free from bubbles with a high transmission factor for use in the forming of cells and applicators used in producing serums and vaccines for the armed forces. This quartz has the quality of transmitting ultraviolet rays through a lower range of the spectrum than any other commercial quartz.

Science News Letter, April 7, 1945

INVENTION

Patents Seized From Aliens Now Abstracted

► MECHANICAL, electrical and non-chemical patents, seized from enemy aliens and nationals of occupied countries by the American government, have been abstracted and the abstracts printed. They are available in five volumes containing information relative to 37,000 patents, or in separate sections by subjects. Two-thirds of the patents were granted to Germans. Abstracts of 8,000 chemical patents have previously been made available.

The patents now abstracted include such broadly diversified fields as aeronautics, brakes, electric lamps and heating, electric furnaces, foods and beverages, internal combustion engines, machine elements, motors, printing, electronics, and refrigeration, as well as many household articles. Telephony, telegraphy, textiles and tools are also included.

The abstracts consist of the inventor's claim to the patent and a reproduction of the drawing as published in the *Official Gazette* of the U. S. Patent Office.

Licenses under most of these patents are readily obtainable by any United States citizen upon application and payment of an administrative fee of \$15 per patent. Over 9,000 have already been licensed by the Alien Property Custodian to nearly 700 persons or firms. This office issues all licenses.

Science News Letter, April 7, 1945



Spending the Savings

► THE GREAT majority of familiar spring flowers spring from the underground storage organs in which food-stuffs, usually in the form of starches and sugars, were accumulated during the preceding summer and fall. Dig up almost any of the abundant species—jack-in-the-pulpit, spring-beauty, bloodroot, trout-

lily, Solomon's-seal, May-apple, trillium, Dutchman's-breeches, wild iris, columbine—and you will find a bulb, or a fleshy rootstock, or a bundle of thickened roots, or some other form of vegetable savings account, which is now being spent on the beautiful and necessary business of blossoming.

It is a matter of practical necessity that this is so. The reproductive process, of which flowers are the symbol and the means, requires a considerable outlay of material and energy. Flowers do not produce this for themselves; it has to be supplied by the rest of the plant body. And annuals, plants that start anew each year from seed, require time to get their growth and to store up a surplus before they can turn to the serious and costly undertaking of producing flowers and setting seed. Hence the heyday of annual species comes in summer and early autumn.

Preparing for this year's spring flowers was really last summer's work—perhaps the work of more than one summer. The plant, starting from seed or through some form of asexual propagation, sends up a crop of flowerless leaves through one or

more seasons, slowly accumulating in its underground parts the surplus of food material that is left over after its daily wants have been supplied. Then, when enough has been piled up, it is expended freely and energetically—like a thrifty human couple cheerfully spending their savings in launching a family.

Some plant species end their life cycle with one offering of flowers and seeds—they blossom once, bear their fruit and then die. Much more common, however, are plants that go on growing new underground parts, which will continue vegetative propagation even while previously accumulated stores in the matured portions are being used up in the production of flower stalks. Thus we have the formation of offsets at the base of lily and hyacinth bulbs, and continued growth at the tips of the rhizomes of May-apple, iris and Solomon's-seal. The devices are many, though similar, and the end accomplished is the same—the survival of both individual and species.

Science News Letter, April 7, 1945

Road maintenance taxes on vehicles were collected 400 years ago in Scotland.

Pregnancy, Needed Weight-Gain, and Proteins

One of the tasks imposed upon the gravid organism is to produce new tissue to the extent of almost one-fifth of its own normal body weight.* Unless protein supply in the diet is adequate, quantitatively as well as biologically, the hazard for the maternal organism increases and the development of the fetus may be impaired. The proteins of meat are of the right kind not only to lay down these new tissues, but also to provide for the stepped-up functions during pregnancy, for which proteins are essential.

*“During pregnancy the average normal woman gains approximately 18-22 pounds, which represents the growth of the uterus, breasts and other organs as well as the fetus and placenta. In other words, a pregnant woman in nine months reproduces tissue almost equivalent to one-fifth of her own normal body weight. It must not be forgotten that the chief function of protein is to supply the tissue-building material of the body, that the need for this material is increased during pregnancy and that the protein deficiency in the diet of the nonpregnant woman may become dangerous when maternity intervenes . . . It is reasonable to assume that protein foods satisfy appetite earlier than the others and make it content with fewer calories. In this respect we have found high protein diets of value for weightrestriction during pregnancy.” (Arnell, R. E.; Guerriero, W. F.; Goldman, D. W.; Huckleby, E., and Lutz, A. M.: PROTEIN MALNUTRITION IN PREGNANCY, New Orleans M & S. J. 95-114 [Sept.] 1942.)



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NUTRITION

To Combat Malnutrition

➤ **WEAK, DIZZY**, bedridden, often pain-racked and crazed victims of poor diet came by the thousands last year to the Nutrition Clinic at Hillman Hospital, Birmingham, Ala., Dr. Tom D. Spies, associate professor of medicine at the University of Cincinnati and founder and director of the Nutrition Clinic it maintains at Birmingham, reported to the Spies Committee for Clinical Research meeting in New York.

More than half of those who had severe pellagra would have died and one-tenth of those who lived would have spent their remaining years in mental hospitals in 1930. But in 1944 there was not a death among the 5,845 patients with deficiency diseases in the Nutrition Clinic.

More than 2,000 physicians, nurses, chemists and nutritionists from all over the nation watched these suffering men, women and children recover when the specific diet lack that caused their illness was discovered and remedied.

The visiting scientists saw thousands more sent elsewhere for treatment be-

cause their painful neuritis, eye trouble or insanity was not caused by nutritional failure and could not be treated at the clinic. The tests, examinations and careful questioning about diet habits by which diet deficiency diseases or nutritional failure can be detected even when typical signs are lacking were all demonstrated.

For Dr. Spies believes and hopes that tens of thousands who can not come to the Nutrition Clinic and may never hear of it can, through its service as a demonstration center, be saved from death, insanity and the wretched, poverty-stricken existence that may be caused by nutritional failure.

"Few physicians," he said, "realize the meticulous clinical study needed before a diagnosis of deficiency disease is justified. The science of nutrition has advanced so rapidly that the practicing physician wonders what he can include as valid in his day-to-day practice of medicine. Since the Nutrition Clinic was first established, we have felt that we should make every effort to clarify the subject for the physician and to promote wider application of earlier and better methods of treating nutritional deficiency diseases. We are trying to serve as an auxiliary to everyone interested in promoting better nutrition."

Science News Letter, April 7, 1945

by gloved hands in low temperatures while a plane is bouncing around as it does in turbulent weather or combat flying. In the case of broken bones, two or more of these pressure bandages may be used to make a comfortable temporary splint.

Other items in the new high altitude kit include a quantity of morphine kept in a special heated compartment that can be opened while wearing cumbersome flying gloves by breaking open a special built-in lock; sulfa drugs; standard dressings and a special knife that will cut quickly through several layers of heavy flying clothing when a compression bandage needs to be applied without injuring the wounded man.

Science News Letter, April 7, 1945

MEDICINE

More Disease Germs May Yield to Streptomycin

➤ **HOPE** that still another group of microorganisms that plague mankind with disease and death may be brought under control by streptomycin, a remedy of the penicillin class, appears in a report by Dr. F. R. Heilman, of the Mayo Clinic.

The germs are known as Friedlander's bacilli and also as Klebsiella. They occasionally cause a severe type of pneumonia and may also cause abscesses, ear trouble, meningitis, osteomyelitis, blood poisoning and a form of heart trouble. They are not uncommonly found in the sputum of patients with chronic bronchitis.

Streptomycin, Dr. Heilman and associates found, checked the growth of these germs in test-tube experiments. It protected mice from lethal doses of the germs.

Streptomycin was then given by Dr. W. E. Herrell to two patients who had respiratory infections, with Klebsiella persistently present in the sputum. The germs promptly disappeared from the sputum after streptomycin treatment was started.

The results, the scientists report, suggest that streptomycin may be useful in treating patients with infections caused by the Friedlander group of microorganisms.

Science News Letter, April 7, 1945

DDT, the new insecticide, is chemically dichloro-diphenyl-trichloroethane and is made by condensing chlorobenzene and chloral in the presence of sulfuric acid.



HOW COLUMBIA UNIVERSITY USES TYPE K POTENTIOMETERS

In order to provide their advanced students with a reliable setup for making highly precise measurements of potential difference and electromotive force, the Chemistry Department of Columbia University equipped their laboratory with four Type K-1 Potentiometers, shown above. The oldest of these instruments has been in use since 1912 and the youngest is several years old. All potentiometers are supplied by a single, large storage battery of highly constant voltage, and each instrument is permanently connected to a No. 2420 enclosed lamp-and-scale galvanometer.

Type K-1 has two ranges, 0-1.61 volts and 0-0.161 volts. We also supply Type K-2, with a third range of 0-0.0161 volt. It is direct-reading on the highest range, and its last tenth, hundredth, or thousandth volt is spread over a 5-meter-long slidewire. The price of the K-1 is \$250, and the K-2 is \$300.

For further information, see Catalog E-50B(3)



MILITARY SCIENCE

Emergency First Aid Kit Is Also a Life Raft

➤ **A NEW** first aid kit specially designed for use at high altitudes in B-29 Superfortresses has been developed by Col. John L. Gallagher of Valley Forge General Hospital at Phoenixville, Pa., reports the magazine, *Air Force*. The case in which the kit is assembled acts as a self-sealing buoyant life raft which will support the weight of one man for some time, if the plane is forced down at sea.

The main feature of the kit is a new pressure bandage which consists of a gauze pad stuffed with packing material, with a bandage roll attached. This forms a pliant but firm covering for large and small wounds and eliminates the need for a conventional tourniquet. It effectively binds the wound without shutting off the flow of blood. This bandage was designed for quick, easy handling

Books of the Week

➤ **BUSY WARWORKERS** and others who want a quick, popular-styled story of the inner-workings of the mightiest air force in the world will find **THE STORY OF THE U. S. ARMY AIR FORCES**, compiled and illustrated with over 100 full color maps, charts and action drawings by Jim Ray (*Garden City*, \$2) a good evening's reading. It gives the answers to what planes we fight with, where we fight from, and what goes on in action. Original and authentic, this delightful book will please the least ardent adult aviation enthusiast, and make a welcome gift for a teen-age air-minded boy or girl.

Science News Letter, April 7, 1945

➤ **RADIO FREQUENCY** electric waves and other waves with frequencies of alternation in billions of cycles per second, are discussed in **INTRODUCTION TO MICROWAVES** by Dr. Simon Ramo. It is an excellent treatment for persons with some knowledge of the fundamentals of electricity (*McGraw*, \$1.75)

Science News Letter, April 7, 1945

➤ **TRUE UNDERSTANDING** of two of the secret weapons of this war, in lucid language the non-technical reader can enjoy, is given in **ROCKETS AND JETS** by Dr. Herbert S. Zim (*Harcourt*, \$3). It contains the type of information that the newspaper reader needs to bring rockets and jet propulsion into true perspective. The book will prove useful in the home, school, office, and in the barracks. It is a book the progressive-thinking reader will always want at his elbow, and one to which he will refer again and again.

Science News Letter, April 7, 1945

➤ **AIRPLANE CONSTRUCTION** has advanced so rapidly in recent years with the development of high-speed, rocket and jet propelled aircraft that the aero mechanic, engineer, and designer often have difficulty understanding the valuable properties of currently used airframe materials, including plastics. **AIRFRAME MATERIALS** by F. S. Stewart (*McGraw*, \$2.50) successfully correlates the most important recent advances in materials and procedures for applying them to airplanes. Written so that the student will find little difficulty in grasping the technical data, yet detailed enough to make it a valuable desk-reference book for the engineer.

Science News Letter, April 7, 1945

Just Off the Press

COLLEGE ALGEBRA AND TRIGONOMETRY, a Basic Integrated Course—Frederic H. Miller—*Wiley*, 324 p., illus., \$3.

CONSTITUTION AND DISEASE, Applied Constitutional Pathology—Julius Bauer—*Grune*, 247 p., \$4.

THE GENUS CERATIUM IN THE PACIFIC AND NORTH ATLANTIC OCEANS—Herbert W. Graham and Natalia Bronikowski—*Carnegie Inst.*, 209 p., paper, illus., \$2.

IT'S FUN TO MAKE IT YOURSELF—Stacey Maney, ed.—*Jour. of Living Publishing Corp.*, 384 p., illus., \$2.95.

JANE'S FIGHTING SHIPS, 1943-44—Francis E. McMurtrie, ed.—*Macmillan*, 582 p., illus., \$19.

THE LIVESTOCK OF CHINA—Ralph W. Phil-

lips and others—*Gov't Print. Off.*, 174 p., paper, illus., 30c.

MARINE BOTTOM SAMPLES COLLECTED IN THE PACIFIC OCEAN BY THE CARNEGIE ON ITS SEVENTH CRUISE—Roger R. Revelle — and **RADIUM CONTENT OF OCEAN-BOTTOM SEDIMENTS**—Charles S. Piggot—*Carnegie Inst.*, 196 p., paper, illus., \$2.

THE STORY OF PENICILLIN—Boris Sokoloff —*Ziff-Davis*, 167 p., \$2.

STRESS RELIEF OF WELDMENTS FOR MACHINING STABILITY—J. R. Stitt—*Ohio State Univ., College of Eng'g*, 47 p., paper, illus., 50c, (*Eng'g Experiment Station Bull.* no 121)

TRAUMA IN INTERNAL DISEASES, with Consideration of Experimental Pathology and Medicolegal Aspects—Rudolf A. Stern—*Grune*, 575 p., \$6.75.

THE WORLD AT WAR, 1939-1944, a Brief History of World War II—Military Intelligence Division, War Dept—*Infantry Journal*, 416 p., paper, illus., 25c

Science News Letter, April 7, 1945

New square *milk bottles* are popular because they conserve space.

To secure best results in *quick-freezing* sausage meat and ground beef, salt should be omitted because it seems to stimulate oxidation; sage, pepper, mace, ginger and other common spices aid in the preservation.

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☼ **CAMERA SUPPORT**, one end of which rests on one shoulder and the other is grasped by one hand, holds the instrument on a flat surface in front of the face. An adjustable strap over the shoulder permits the support and camera to be carried, when not in use, swinging under the arm.

Science News Letter, April 7, 1945

☼ **INSULATION resistance tester** is a crankless American improvement on instruments of the same capacity formerly imported. It has a spotlight galvanometer with a 100-millimeter scale, calibrated 0-20,000 megohms for direct reading, at a potential of 500 volts. Power is supplied by dry cells.

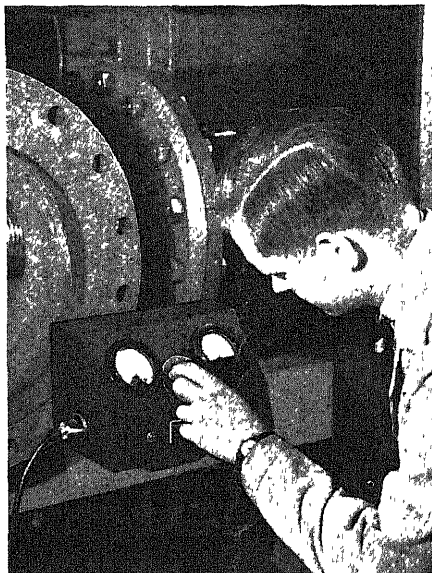
Science News Letter, April 7, 1945

☼ **ELECTRIC TESTER**, fountain pen size, has a tiny neon lamp and two contact tips separated in use by the thumb and a finger. It tests for live wires, grounded lines, open circuits, shorts and polarity, and indicates voltages from 90 to 500 volts, AC or DC, by the glow-intensity of the light.

Science News Letter, April 7, 1945

☼ **FOUNTAIN COMB**, that wets the hair as it combs, has an elongated liquid container along one side of its back with openings through which the liquid leaks onto the teeth when in use. No leakage takes place when the comb is resting on a flat surface with the reservoir side downward.

Science News Letter, April 7, 1945



☼ **CONTROL UNIT**, for a new all-metal thermocouple vacuum gauge, operates directly on 100-volt AC and indicates low pressures accurately and continuously. The light, portable instrument, pictured above, may be carried about and connected to thermocouple gauges in any part of the factory vacuum system.

Science News Letter, April 7, 1945

☼ **TRANSMISSION belts** for machinery now have steel cables in the carcass instead of cord or fabric. The cables are made of highly flexible, special twisted, finely stranded, high-tensile wire, and

are imbedded in rubber and encased in a fabric envelope.

Science News Letter, April 7, 1945

☼ **SELF-IGNITION attachment** for cigars and cigarettes is a small device which is put over one end of the cigar. It has a cup-shaped center that contains a material, such as pyrophoric iron or lead, that ignites when air is drawn through it. A cap prevents burning when not in use.

Science News Letter, April 7, 1945

☼ **AMPHIBIOUS VEHICLE**, recently patented, is a luxurious cabin cruiser which is quickly convertible into an auto trailer and may be used for campers on water or on land. Automobile wheels, which carry the vehicle when on shore, retract into compartments in the hull when in water.

Science News Letter, April 7, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin #53.

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Question Box

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ANTHROPOLOGY

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To what are the increases in speech defects ascribed? p. 216.

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Where published sources are used they are cited.

Include postal unit number, if any

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 14, 1945



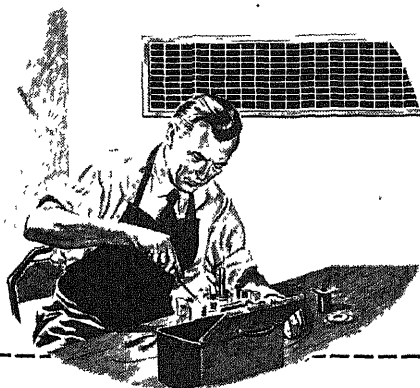
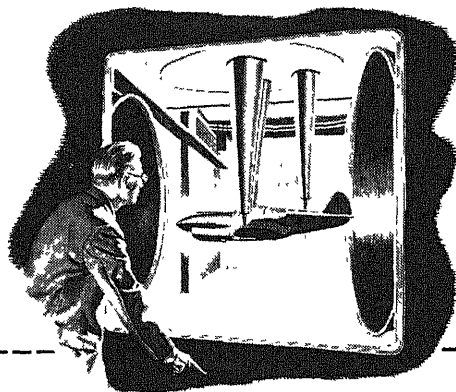
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A SCIENCE SERVICE PUBLICATION

In a wind tunnel an **AERONAUTICAL ENGINEER** uses a 40,000 horsepower electric motor to create a 400-mile-an-hour tornado for testing war planes.

... the name on the **MOTOR** is *Westinghouse*.

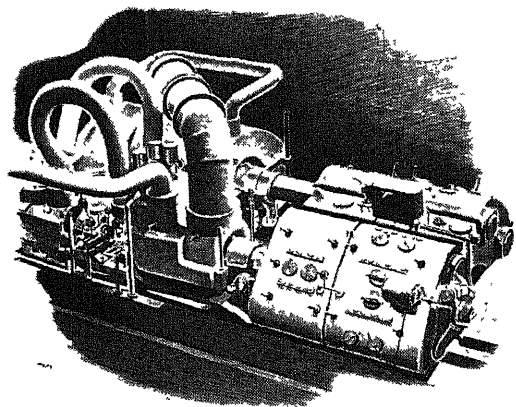
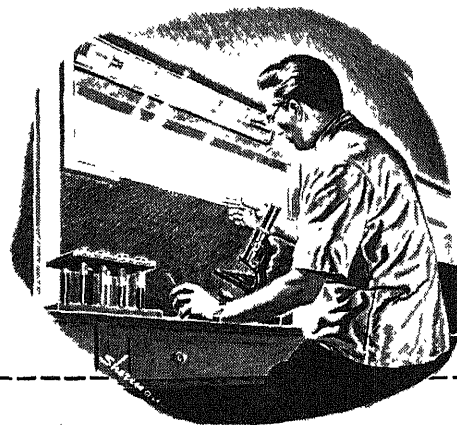


In a factory a **WORKER** assembles delicate bomb-sight parts in air made dust-free by the Precipitron* electrostatic air cleaner.

... the name on the **PRECIPITRON*** is *Westinghouse*.

In a penicillin plant a **SCIENTIST** uses a Sterilamp* bactericidal tube to protect this life-saving drug from contamination by air-borne bacteria.

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TODAY — These are some of the ways in which Westinghouse products are serving in the war effort.

TOMORROW — Existing and new products of Westinghouse research and engineering will serve industry and the home.

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TED MALONE—Mon. Tues. Wed. Evening, Blue Network

PSYCHOLOGY

Basis for Lasting Peace

More than 2,000 psychologists agree on ten points which must be considered in framing the peace. The document has been submitted to members of Congress.

➤ TEN POINTS of human nature which must be considered in the framing of a lasting peace, as agreed to by more than 2,000 American psychologists, have been sent to all U. S. Senators and members of the House of Representatives to aid them in making plans for an enduring peace, it has been announced.

The statement on "Human Nature and the Peace" was framed by an informal committee of 13 psychologists headed jointly by Dr. Gordon W. Allport, chairman of the department of psychology at Harvard University, and Dr. Gardner Murphy, chairman of the department of psychology of the College of the City of New York, both past presidents of the American Psychological Association, national professional organization of scientists in this field.

The statement was sent for approval to the total membership of the Association, including about 850 members and 2,950 associate members. Of these 3,800, a total of 2,038 endorsed the statement and only 13 dissented.

War is not born in men; it is built into men. This is the first of the ten principles. The frustrations and conflicting interests which lie at the root of aggressive wars can be reduced and redirected, the psychologists state in explaining the first principle.

Racial, national and group hatreds can also, to a considerable degree, be controlled. "Prejudice," the statement declares, "is a matter of attitudes, and attitudes are to a considerable extent a matter of training and information."

Liberated and enemy peoples must participate in planning their own destiny. Complete outside authority imposed on liberated and enemy peoples without any participation by them will only lead to further disruptions of the peace, the psychologists state. The people of all countries must not only have hope for themselves and their children, but must also feel that they have responsibility for achieving their political and economic future.

Clear-cut and easily understood definition of war-guilt is essential. This is another point made by the psychologists who believe confusion among defeated

peoples must be avoided.

Safest guide to framing a peace is to be found in the deep desires of the common people of all lands—another point made in the statement. "Disrespect for the common man is characteristic of fascism and of all forms of tyranny," reads the document. "The man in the street does not claim to understand the complexities of economics and politics, but he is clear as to the general directions in which he wishes to progress. His will can be studied by adaptations of the public opinion poll. His expressed aspirations should even now be a major guide to policy."

Costs of circulating the document for comments and signatures by psychologists were borne by the Society for the Psychological Study of Social Issues.

Members of the informal committee, in addition to the two chairmen, are:

R. S. Crutchfield, now in government service on leave from Swarthmore College, Swarthmore, Pa.; H. B. English, professor of psychology, Ohio State University, Columbus, Ohio; Edna Heidebreder, chairman of the department of psychol-

ogy, Wellesley College, Wellesley, Mass.; E. R. Hilgard, chairman of the department of psychology, Stanford University, Palo Alto, Calif.; Otto Klineberg, in government service on leave from Columbia University, New York; R. Likert, head of the division of program surveys, Bureau of Agricultural Economics, Washington, D. C.; Mark A. May, director, Institute of Human Relations, Yale University; O. H. Mowrer, in government service on leave from department of education, Harvard; C. C. Pratt, chairman of the department of psychology, Rutgers University, New Brunswick, N. J.; W. S. Taylor, professor of psychology, Smith College, Northampton, Mass., and E. C. Tolman, chairman of the department of psychology, University of California, Berkeley, Calif.

Science News Letter, April 14, 1945

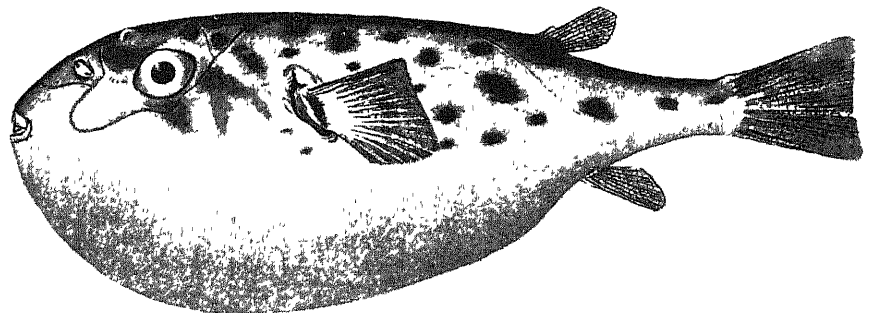
PSYCHOLOGY

Complete Text of Peace Document

Human Nature and the Peace

A Statement by Psychologists

➤ HUMANITY'S demand for lasting peace leads us as students of human nature to assert ten pertinent and basic principles which should be considered in planning the peace. Neglect of them may breed new wars, no matter how well-intentioned our political leaders may be.



RARE SPECIMEN—Strange-looking, this fish is one of the two rare specimens found near Cape Henry, Va., by Hugh H. Iltis. Dark green above, the color of the skin, without spines or prickles anywhere, fades to light green on the flanks and white on the belly. The large spots scattered over the back and sides of this seven-inch fish are black. Sketched by Mrs. A. M. Aul of the U. S. National Museum, the *Sphaeroides pachygaster* had not been seen since it was first caught in the West Indies. Although younger than the adult caught off Barbados, Earl D. Reid of the National Museum reports to the American Society of Ichthyologists and Herpetologists that the smooth skin and position of the dorsal fin mark it as belonging to this species.

1. *War can be avoided; War is not born in men; it is built into men.* No race, nation, or social group is inevitably warlike. The frustrations and conflicting interests which lie at the root of aggressive wars can be reduced and re-directed by social engineering. Men can realize their ambitions within the framework of human cooperation and can direct their aggressions against those natural obstacles that thwart them in the attainment of their goals.

2. *In planning for permanent peace, the coming generation should be the primary focus of attention.* Children are plastic; they will readily accept symbols of unity and an international way of thinking in which the evils of imperialism, prejudice, insecurity, and ignorance are minimized. In appealing to older people, chief stress should be laid upon economic, political, and educational plans that are appropriate to a new generation, for older people, as a rule, desire above all else, better conditions and opportunities for their children.

3. *Racial, national, and group hatreds can, to a considerable degree, be controlled.* Through education and experience people can learn that their prejudiced ideas about the English, the Russians, the Japanese, Catholics, Jews, Negroes, are misleading or altogether false. They can learn that members of one racial, national, or cultural group are basically similar to those of other groups, and have similar problems, hopes, aspirations, and needs. Prejudice is a matter of attitudes, and attitudes are to a considerable extent a matter of training and information.

4. *Condescension toward "inferior" groups destroys our chances for a lasting peace.* The white man must be freed of his concept of the "white man's burden." The English-speaking peoples are only a tenth of the world's population; those of white skin only a third. The great dark-skinned populations of Asia and Africa, which are already moving toward a greater independence in their own affairs, hold the ultimate key to a stable peace. The time has come for a more equal participation of all branches of the human family in a plan for collective security.

5. *Liberated and enemy peoples must participate in planning their own destiny.* Complete outside authority imposed on liberated and enemy peoples without any participation by them will not be accepted and will lead only to further disruptions of the peace. The common people of all countries must not only feel their political and economic future holds genuine hope for themselves and for

their children, but must also feel that they themselves have the responsibility for its achievement.

6. *The confusion of defeated people will call for clarity and consistency in the application of rewards and punishments.* Reconstruction will not be possible so long as the German and Japanese people are confused as to their status. A clear-cut and easily understood definition of war-guilt is essential. Consistent severity toward those who are judged guilty, and consistent official friendliness toward democratic elements, is a necessary policy.

7. *If properly administered, relief and rehabilitation can lead to self-reliance and cooperation; if improperly, to resentment and hatred.* Unless liberated people (and enemy people) are given an opportunity to work in a self-respecting manner for the food and relief they receive, they are likely to harbor bitterness and resentment, since our bounty will be regarded by them as unearned charity, dollar imperialism, or bribery. No people can long tolerate such injuries to self-respect.

8. *The root-desires of the common people of all lands are the safest guide to framing a peace.* Disrespect for the common man is characteristic of fascism and of all forms of tyranny. The man in the street does not claim to understand the complexities of economics and politics, but he is clear as to the general directions in which he wishes to progress. His will can be studied (by adaptations of the public opinion poll). His expressed aspirations should even now be a major guide to policy.

9. *The trend of human relationships is toward even wider units of collective security.* From the caveman to the twentieth century, human beings have formed larger and larger working and living groups. Families merged into clans, clans into states, and states into nations. The United States are not 48 threats to each other's safety; they work together. At the present moment the majority of our people regard the time as ripe for regional and world organization, and believe that the initiative should be taken by the United States of America.

10. *Commitments now may prevent postwar apathy and reaction.* Unless binding commitments are made and initial steps taken now, people may have a tendency after the war to turn away from international problems and to become preoccupied once again with narrower interests. This regression to a new post-war provincialism would breed the conditions for a new world war. Now is the time to prevent this backward step, and to assert through binding action

that increased unity among the people of the world is the goal we intend to attain.

Science News Letter, April 14, 1945

Clear water has been found to be the best lubricant for a diamond-drill bit used in mining, for cooling the bit, removing the cuttings, and obtaining the most footage in drilling.

The *grasshopper mouse* (so named because it preys on grasshoppers) may be heard, out on the short-grass plains or sagebrush-covered hills of the West, singing a tiny, highpitched, musical song in the evenings.

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AERONAUTICS

Cargo Flown to Mexico

Three tons of material, including penicillin, books, recordings and motion pictures reached Mexico City little more than 24 hours after leaving New York.

➤ THREE tons of cargo, including penicillin, books, recordings and motion pictures reached Mexico City on April 3, little more than 24 hours after leaving New York City on the first international commercial Airfreight shipment in history. Endorsed by the Office of Inter-American Affairs, the goodwill fast freight set a precedent in United States-Mexican relations.

Operated by American Airlines, with a DC-3 Airfreighter which was adapted from a regular passenger airliner, this flight was the first of a regular schedule of cargo flights to be expanded as more planes are made available by the Army.

Although American Airlines, and American Airlines de Mexico, inaugurated the first regular schedule of the international air freight two weeks ago, when about two tons of cargo from New York arrived in Mexico City, covering 2,458 miles in little more than 24 hours, the story of international air freight is more than the pioneering of one air line. It is more than the efforts of an American industry working with the Office of Inter-American Affairs. It is the story of people of our United States offering to the people of Mexico the tools and materials it needs to help keep healthy and progressive, for air freight will carry the products of American research and industry, produced by folks like those you know, for the benefit of their friends in another country. John and Jane Doe manufacture penicillin here so that Carlos and Conchita can secure it to help them get well when their Mexican doctor prescribes it.

In addition to a shipment of penicillin from E. R. Squibb & Company, the plane carried critical supplies and equipment from Wyeth Incorporated to be used to increase the production of the life-saving medicine at the Wyeth-Stille laboratories in Mexico. This is the only laboratory south of the Rio Grande successfully producing penicillin. Air transportation will enable research workers in Mexico to keep abreast of new developments.

The Office of the Co-ordinator of Inter-American Affairs shipped 100 copies of *En Guardia*, an overseas publication

sponsored by that office, as well as a number of recordings and motion pictures for use in Mexico.

Science Service placed on this first Airfreighter flight 100 copies of the *Overseas Edition of Science News Letter*, a monthly magazine designed to help scientists in all parts of the world keep abreast of latest developments in science. Also included in the freight were copies of medical books to be translated into Spanish for the use of medical students in Mexico and other Latin American republics.

Watson Davis, director of Science Service, was in Mexico City to receive the shipment, and to present copies of the publications flown by airfreighter to officials of the Mexican government as a good-will gesture.

The radio beam on which the American Airlines plane flies from LaGuardia Field to Mexico City is actually a series of continuous radio signals sent out from stations located at intervals of from 80 to 100 miles along the route. The recently established Monterey-Mexico City link of this system will permit pilots to fly the beam on the entire flight.

Science News Letter, April 14, 1945

RADIO

Chile Soon To Be Served By Powerful Radio Station

➤ CHILE, the longest narrow country in the world, will soon be served by one of the most powerful radio stations in the western hemisphere. The new station is one of the most modern broadcasting facilities in the world. Identified by the call letters CB114 it is the first longwave radio station to reach from Africa, on Chile's northern border, down through the 2600-mile length and 150-mile width to Punta Arenas, southernmost city in the world. Up to now, the country has been dependent on short-wave broadcasting for national coverage, reports the Radio Corporation of America's International Division.

Located near the capital city of Santiago, between the Andes mountains and the South Pacific, the station was specially designed and located to overcome long-wave radio transmission problems pre-



ZIPPED IN—This shows how the cargo is held in place in the Airfreighter. The packages are zipped, buckled or strapped into the separate bins to keep them from shaking while in the air

sented by Chile's rugged topography and long, narrow shape. A special type directional antenna and an elaborate ground system concentrate broadcast energy generally northward and southward. Although the rated power of the radio station is 50 kilowatts, the antenna and ground system provide an unmodulated carrier power of 135 to 140 kilowatts to the north and south. The antenna was specially built to fit the curve of the country. Two 300-foot high transmitting masts are surrounded by an underground network of 22 miles of four-millimeter copper wire to guarantee high antenna efficiency.

CB114 will operate on a frequency of 1140 kilocycles. It is the custom in Chile to designate a radio station by its call letters plus the first three digits of its frequency. The station was designed and built by Corporación de Radio de Chile. It is owned and will be operated by the Corporación Chilena de Broadcasting, headed by Adriano Iz Reyes. Broadcasting studios are located in Santiago.

In addition to providing national coverage for the people of Chile (her population is less than that of the state of Michigan), the new station will reach other countries in Latin America, including the southern regions of Argentina, as well as Peru to the north.

Science News Letter, April 14, 1945

PSYCHOLOGY

Shock Affects Memory

Experiments on rats indicate that electric shock treatment, widely used for mental illness, may have a damaging effect on memory and ability to re-learn.

➤ **ELECTRIC** shock treatment, widely used for the mentally ill, may have a damaging effect on memory and also on ability to re-learn, if findings in experiments on rats hold good for humans. The animal experiments were reported to the Eastern Psychological Association in independent papers by Dr. Carl P. Duncan, of Brown University, and Elliott M. McGinnies, Jr., of Harvard University.

In Dr. Duncan's experiment one group of rats were given electric shocks through the head lasting 22 hundredths of a second daily for 30 days. They were compared with two other groups of rats, one group receiving similar shocks through the hind legs and the others just being left in their cages.

All the rats had learned to run through a maze without making any wrong turnings. At the end of the 30-day period they were made to learn the maze again. The animals that had had the shocks through the head were inferior to both other groups although those who had had shocks through the legs were not significantly slower in re-learning than the group that was not shocked.

Most of the loss, Dr. Duncan reported, seems to be in retention, and seems to be due to a direct effect on cerebral tissue.

Dr. McGinnies' experiment on two albino rats that had learned to press levers one after the other to obtain a reward, suffered a temporary and sudden breakdown of the habit after electric shock convulsions. But he believes this might be due to loss of drive, although actual impairment of memory is a possibility.

Psychoneurotics Picked

➤ **A SIMPLE** questionnaire of 92 questions, designed for the armed services, which can be answered by merely circling the answers "yes" or "no" and which can be given by an enlisted man and scored within one minute, picks out the men with serious personality or nervous difficulties from those who are in good mental health, with a high accuracy.

The test, which can be given to any number of men at the same time, was reported to the meeting by the following

research team. Dr. Arthur Weider, Dr. Kieve Brodman, Dr. Bela Mittelman and Dr. Harold G. Wolff, of Cornell University Medical College and Dr. David Wechsler, of Bellevue Hospital.

The questionnaire was tested on 980 enlisted men in Army camps and Army and Navy hospitals. Of those who gave more than 23 "wrong" answers on the questionnaire, all but 9% were found in a psychiatric interview to have personality disturbances and 92% were "severe psychoneurotics."

Altitude Affects Speech

➤ **STRATOSPHERE** flyers may have difficulty in speaking so that others in the crew can understand them over their inter-phones, experiments conducted at the College of the City of New York and reported by Drs. G. M. Smith and Lt. (jg) C. P. Seitz, indicate.

The understandability of vowels, consonants and syllables all dropped as altitude increased, it was found in tests conducted in a chamber simulating altitude conditions. Somewhere between 13,600 feet and 16,900 feet flyers reach a height at which their speech falls off in intelligibility.

If the original sound level is low, the loss of accuracy in understanding the speech is great and the words rapidly become unintelligible.

Apes Slower To Sit Alone

➤ **THE HUMAN** baby can learn to sit up alone at an earlier age than an infant chimpanzee can, two psychologists of the Yerkes Laboratories of Primate Biology, reported.

Capt. Austin H. Riesen and Dr. Elaine F. Kinder used tests developed for studying the growth of human babies to study the development of the little ape infants.

In general, they found, the chimpanzee baby gains control over his posture earlier than does the human. At birth, the chimpanzee can already control his head in ways not possible to human babies until they are four weeks or more old.

But ape and human are more evenly matched in sitting, and in sitting alone the human actually matures first. That, Dr. Kinder explains, is because of the difference in structure—the ape is top heavy with broad shoulders and narrow hips.

Science News Letter, April 14, 1945

MEDICINE

8,000 Pints of Blood A Week from Fort Worth

➤ **A STREAM** of blood totalling 8,000 pints a week flows from the heart of Texas to battlefields in Europe and the South Pacific for use in treating shock from wounds and burns. Blood serum albumin has been produced in Fort Worth for the U. S. Navy since late 1943 at the Armour Laboratories plant, the only one especially built for fractionating blood plasma.

The process for the fractionation of blood plasma, which is adaptable to large-scale operation and which permits the separation of the many therapeutically valuable constituents of plasma, is the development of Prof. E. J. Cohn and associates at Harvard University Medical School, under a contract with the Office of Scientific Research and Development.

Normal human serum albumin is admirably adapted to the treatment of shock resulting from wounds and burns. It can be prepared as a stable sterile solution in water, ready for instant use. This solution is produced in highly concentrated form so that the resulting package is very small, in comparison with that required for dried plasma.

Science News Letter, April 14, 1945

ENGINEERING

National Uniformity of Working Plans Expected

➤ **NATIONAL** uniformity in the preparation of working drawings in military organizations and in war industries, as far as lettering and methods of indicating and specifying materials, finishes and other essentials are concerned, will result from the use of American war standards for drawing and drafting-room practice now under preparation by the American Standards Association at the request of the War Production Board. The Board desires particularly to bring about a correlation in the practices of the Army and Navy with those of industry.

It is a large undertaking, as millions of blueprints, plans and drawings are

made each year. They are used in the design and manufacture of even the simplest mechanical device.

Marked economies will result from the work, it is felt by Army and Navy authorities. The present existing diversity of drafting practices between the various branches of the Armed forces and industry, together with the attendant waste,

confusion and delays in providing the drawings for war equipment, has long been recognized by the services, and both Army and Navy have appointed committees to cooperate in bringing together the practices in the various branches of the services, and, through the American Standards Association, correlating these practices

Science News Letter, April 14, 1945

ENTOMOLOGY

Records Mosquitoes' Song

The love-songs of these pests have been "waxed" on phonograph records. The object is to use the recordings in luring the insects to their doom in traps.

► LOVE-SONGS of mate-seeking mosquitoes have been "waxed" on phonograph records in the public health laboratories of Cornell University Medical School, by Dr. Morton C. Kahn, Dr. William Celestin and Dr. William Offenhauser. Their intention is to use these mating calls to lure the death-carrying pests to their own death in insect traps.

The insects' sounds, often only faintly audible to the human ear or even quite inaudible, were greatly amplified before

being recorded. Some species, such as *Aedes aegypti*, carrier of yellow fever, have hitherto been thought to be entirely mute, but the experiments demonstrated that they have songs of their own, only they are outside the range of human hearing.

A number of interesting things about mosquitoes' singing were learned in the course of the work. With practice, the experimenters learned to distinguish between the songs of various genera of

mosquitoes, as one can tell the difference between the songs of birds. Not only that, they found distinct differences between the songs of male and female mosquitoes.

Voices of male mosquitoes were found generally to be higher-pitched than those of females. The female insects also had louder voices than their mates. But even at their loudest, they were often so faint that human ears could not perceive them, even when a hundred or more of the insects were induced to sing in chorus. Such choruses, of males at least, can be provoked by getting one female to start singing.

Mosquito sounds are as a rule not especially high pitched. They have a frequency range between 200 and 1,500 cycles per second, which is about the middle of the frequency range for human hearing.

Mosquitoes apparently are not soloists; at least, they will not perform without an audience. Solitary insects never sing; two or more must be together to get the concert started. If two mosquitoes of the same sex do not choose to sing, the addition of a third, of opposite sex, will often set them going.

Mosquito calls are not all alike. They seem to have a variety in emotional content. One type of song will be a mating call, another will indicate anger, a third will give warning of danger.

Additional recordings are now being made, the experimenters state, and as soon as conditions permit, each significant tone will be tested in the laboratory and in the field, to discover its possible usefulness in luring mosquitoes into traps.

Details of the research are reported in *Science* (March 30).

Science News Letter, April 14, 1945

CHEMISTRY

New Electrolytic Device Provides Motor Fuel

► A BOLD bid to make motor fuel cheap by cracking water into oxygen and hydrogen and then recombining them is represented in patent 2,373,032, obtained by Bernard Klein of Baltimore. Mr. Klein has an electrolytic device which he holds to be more practicable than those hitherto tried for this purpose. It consists of a relatively long horizontal cylinder, with electrodes in its opposite ends, and baffle plates to prevent undue sloshing of the liquid and to keep the gases separated. Acidulated water is fed in near the middle, and the gases are led out through the end chambers.

Science News Letter, April 14, 1945



SELF-PROPELLED DEATH—Massed batteries of rockets give this LCM the striking power of a much larger vessel. Light and easily-handled, rockets are becoming increasingly more accurate under the scientific improvements constantly being developed by Navy ordnance experts.

BOTANY

Pear Blossoms Are Early In Eastern United States

See Front Cover

➤ PEAR BLOSSOMS were very early this year in midwestern, eastern and southeastern parts of the country. The photograph of these blossoms on the front cover of this SCIENCE NEWS LETTER, was taken by Fremont Davis, Science Service staff photographer, on March 28 near Washington, D. C. The famous Japanese cherry blossoms around the Tidal Basin in Washington bloomed on March 20. The only other year they have been this early was in 1927. Fruit trees in general bloomed precociously this spring.

Dogwood, redbud and crabapple are at least a month early in these sections of the country. The double cherry blossoms in Washington, and the lilac were three weeks early. Cowslip, trillium and narcissus showed their faces about a week early.

Science News Letter, April 14, 1945

AGRICULTURE

Oil Sprays Kill Weeds In Carrot Gardens

➤ CERTAIN paint-thinner oils sprayed on weeds in a carrot or parsnip garden kill the weeds effectively without injury to the vegetables, according to J. R. Heppler of the University of New Hampshire in a recent statement reviewing experimental work at two agricultural colleges, the Massachusetts State College and Cornell University. Sovasol No. 5 and No. 75, distributed by the Standard Oil Company of New York, were used. The first is widely used as a paint-thinner and for dry-cleaning clothes, the second is also a paint-thinner.

When Sovasol No. 75 was used, it was found necessary to thin it with white kerosene or stove oil; otherwise it burned the vegetables severely. With two parts of the kerosene to one part of the oil no burning occurred.

The best time to spray, it was found at the Massachusetts institution, is when the weeds are very small. When they were from five to six inches high, the spraying treatment was not effective. Small weeds wilted within an hour of treatment.

The spray should be applied with a flat nozzle, it was found, rather than with a circular nozzle. Approximately 80 gallons of oil spray per acre are needed.

The Cornell investigators found that

carrots, celery, celeriac and turnip-rooted parsley were quite tolerant to oil sprays, but that such crops as beets, lettuce, onions, and spinach, among others, were susceptible to injury. They determined that the oil sprays can be used with safety with all members of the parsley family, which includes carrots, parsnips and celery.

Science News Letter, April 14, 1945

ANIMAL HUSBANDRY

Flying Eggs by Air Doesn't Affect Hatchability

➤ EGGS for the restocking of Europe's depleted poultry-yards can be shipped by airplane without harm to their hatchability, experiments by Dr. Richard M. Fraps, U. S. Department of Agriculture zoologist, strongly indicate. The research was carried on in the laboratories of the Bureau of Animal Industry at Beltsville, Md.

Sending either baby chicks or fertile eggs by ordinary ocean freighter is out of the question at present. It takes so long to make the trip, under wartime conditions, that the chicks would all die, and very few of the eggs would hatch. Shipment by air freighter, however, is practicable; and it is considered better economy to send eggs for hatching on the other side, rather than chicks already hatched.

Some one raised the question whether the reduced barometric pressures encountered at ordinary flying altitudes might not affect the hatchability of the eggs. So Dr. Fraps paralleled on a small scale the pressure-chamber tests to which aviator candidates are subjected: he put batches of eggs into closed vessels from which the air was partially exhausted. They were given this treatment for 12 hours a day for three successive days—a rough parallel of conditions prevailing on ordinary air-freighter flights. Then the eggs, together with control batches that had not been given the low-pressure treatment, were put into incubators and hatched.

No significant differences in hatchability were found between the "low-pressurized" eggs and the controls, even when pressures were reduced to correspond to altitudes far beyond the ceilings of any existing planes. For example, after exposure to a pressure equivalent to 87,000 feet one lot of eggs gave a 92% hatch, which was actually better than the performance of the untreated eggs used in this particular experiment.

Science News Letter, April 14, 1945

BIOCHEMISTRY

Anti-Germ Chemicals from Neutron Bombardment

➤ GREATER amounts of anti-germ chemicals such as penicillin, streptomycin, streptomycin and the like, or even more powerful chemicals of this general type, may be obtained by means of the cyclotron, it appears from studies by Dr. Wm. G. Myers and Miss Hazel Jean Hanson at Ohio State University.

About 100 new strains or mutations of *Penicillium notatum*, the mold from which penicillin is obtained, have been developed, they report (*Science*, April 6). These new strains were obtained by bombarding the mold spores with neutrons from the cyclotron. These new strains differ markedly in rate of spore formation and anti-germ activity.

The possibility that new anti-germ substances are being produced by the mold as a result of the neutron bombardment is now being investigated.

New strains of the organisms that yield streptomycin and streptomycin are also being obtained by neutron bombardment but not as frequently as in the case of *Penicillium notatum*.

Science News Letter, April 14, 1945

ASTRONOMY

White Dwarf Stars Found By Photographic Method

➤ FIVE NEW white dwarf stars have been added to the list of known faint stars of high temperature and of a density so great as to be almost incredible, Dr. W. J. Luyten of the University of Minnesota and Dr. Martin Dartayot of Argentina's Cordoba Observatory have reported to Harvard College Observatory.

This brings the number of known white dwarf stars to about 75. The newly-discovered white dwarfs are located in the southern constellations of Pavo, the peacock; Phoenix; Tucana, the toucan; and two are fairly close together in the constellation of Musca, the fly.

The stars were discovered when photographs taken with plates which were particularly sensitive to yellow light and those which were especially sensitive to blue light were compared. The plates were taken with the 60-inch reflecting telescope of the Cordoba Observatory.

Science News Letter, April 14, 1945

THE FIELDS

CHEMISTRY

Synthetic Resins Used for Purifying Penicillin

➤ A SIMPLE method of purifying penicillin by means of synthetic resins is reported by Drs. E. Cruz-Coke, F. Gonzalez and W. Hulsen, of the University of Santiago, Chile. (*Science*, March 30)

Known as ionic exchange resins, these gel-like substances have already been used to free water and chemical solutions of inorganic salts. They are of two sorts, one which captures cations and the other anions. The Chilean scientists used specially prepared resins which absorbed proteins, amino acids and various other organic substances from biological materials.

By filtering penicillin first through the cationic resin, Ionac C, and then through the anionic resin, Ionac A, the Chilean scientists report obtaining a product which has all the penicillin activity of the original material but is free of toxicity for experimental animals and man. They believe this simple method will also be useful for purifying other active substances produced by molds and various biological agents. Present methods of purifying penicillin are time-consuming and costly.

Science News Letter, April 14, 1945

CHEMISTRY

Tomatoes May Have More Vitamin A Value

➤ TOMATOES with ten times as much vitamin A value as is contained in varieties now offered on the market may be developed by improved breeding, Dr. F. P. Zscheile of the University of Chicago botany department told the Iowa section of the American Chemical Society.

Such fruit, Dr. Zscheile said, will aid materially in supplying the vitamin A requirements of human beings.

Tomatoes offer unusual opportunities for the study of pigment relationships and for improvement by breeding for high contents of beta-carotene, according to Dr. Zscheile.

The photoelectric spectrophotometer, built by Dr. Zscheile, was used in analyzing the vitamin A, chlorophyll and carotenoids in plants through delicate, intricate measurements with light and ab-

sorption curves. Results can often be obtained with this micro method, now available to most laboratories, which cannot be secured in any other way, he said.

"The carotene content of vegetables varies widely, being high in spinach and broccoli leaves, medium in snap beans and peas, and low in lima beans," he explained. "For successful storage, the necessity for blanching has been shown repeatedly. Quick-frozen vegetables retain carotene reasonably well for one year, but losses are heavy during the second year."

Commercial carrot varieties were found to be remarkably uniform in carotene content, but Dr. Zscheile discovered an unexpectedly high content of alpha-carotene. In eggs, the high carotenol content and its close relationship to vitamin A makes analysis difficult. Spectrophotometric study showed that the chlorophyll and carotenoid contents in alfalfa and corn leaves were not affected greatly by certain fertilizer treatments.

Science News Letter, April 14, 1945

BOTANY

Botanical Collections Undamaged by War

➤ BOTANISTS are commencing to take stock of the world's great herbaria, or collections of pressed botanical specimens, that have been in the path of war. Prof. E. D. Merrill of Harvard University and the Arnold Arboretum states in a report to *Science* (April 6), that he has had communications from the USSR indicating that the great herbarium and botanical library at the Komarov Institute in Leningrad came through the siege of that city undamaged, although many bombs fell in the grounds. Great damage, however, was done to the living greenhouse collections by the fall of bomb-shattered glass.

The Siberian part of the important Turczaninow herbarium at Karkov was removed to Leningrad, and is safe. However, the general Karkov herbarium, the Ukrainian Academy of Science at Kiev and the Nikita Botanical Garden near Yalta were all looted by the Nazis and their scientific treasures removed to Germany.

From Paris it is reported that the great collections at the Museum of Natural History were left undisturbed by the invaders. The one important French collection of botanical specimens that is known to have been destroyed was that at the University of Caen, which was unfortunately in the path of the Normandy invasion.

Science News Letter, April 14, 1945

ORDNANCE

Army's Carbine Becomes Bantam-Weight Machine Gun

➤ THE ARMY'S .30-caliber carbine, that started out as a replacement for the service pistol, has now become a bantam-weight machine gun, a little brother of the B.A.R. By setting a gadget for full automatic fire, it can be made to rip out a burst of 15 shots in less time than it takes a startled Heinie to say "Donnerwetter!" That is, if he lives to finish saying it.

In more sedate terms, the modified weapon's cyclic rate of fire is 750 shots a minute. That works out to 12.5 shots a second, or about one and one-quarter seconds for the 15 cartridges in the ordinary loading clip. It can still be used as a single-shot weapon; a turn of a device known as the selector determines the type of fire to be delivered.

Adaptation of the carbine for light machine-gun jobs was carried out nearly a year ago, but the Army has withheld announcement of the fact until now. It proved its usefulness first in the tough hedgerow fighting of the Normandy campaign, and has been further battle-tested as our troops rolled across France and the Low Countries into Germany. It is said to be an especially good weapon for house-to-house fighting in cities.

Earlier modifications of the carbine have included the addition of a grenade launcher and an attachment to permit the regular trench knife to be used as a bayonet.

Science News Letter, April 14, 1945

GEOLOGY

Course of River Traced, Flowed 1,000,000 Years Ago

➤ THE COURSE of a great river, as big as the Ohio or bigger, that flowed across country from the Southern Appalachians to the Illinois valley more than a million years ago, has been traced by Prof. Karl Ver Steeg of the College of Wooster.

In *Science*, (March 30), Prof. Ver Steeg states that the great stream, which has been given the name Teays river, had its source in the Blue Ridge region of North Carolina and Virginia. It followed a northwesterly course, receiving tributaries draining large parts of what are now the states of Ohio, Indiana and Illinois. Much of its 800-mile-long valley is now buried under the great masses of earth and stones moved in by the great glacial sheets of the Pleistocene ice age.

Science News Letter, April 14, 1945

HORTICULTURE

Plant New Vegetables

Up-to-date catalogues list new seed varieties which are now available for the first time in quantity. Pan-American tomato can be had this year.

By FRANK THONE

➤ VICTORY Gardeners' dreams of last year are turning into realities this spring, as seeds they had heard about but couldn't get are now becoming available in sufficient quantities to justify listing in seed catalogues. And already there are dawns of dreams of new and better vegetables that may be ready a year from now, when the present scanty stocks shall have had another growing season in which to increase and multiply.

That is one of the tantalizing things about being a really up-on-your-toes gardener. You read about a tempting tomato, a luscious lettuce, a bountiful bean, brought to practical perfection by the plant breeders of the U. S. Department of Agriculture or at your own state experiment station—only to run into the discouraging line: "Seeds of this splendid new variety will not be available for general planting until a year from now." So you go back to hoeing your row of the really good plants you have, but they suddenly seem like perverse and wilted runts, fit food only for cutworms and caterpillars, as compared with the feast of Tantalus that has been denied you.

But patience is the gardener's virtue, as it is the fisherman's, and time brings the rewards of waiting. Here are three or four of last year's promises that have become this year's fulfillments.

Breeder's Sensation

Pan-American tomato was the breeder's sensation, not so many months ago. A few fortunates were able to grow it last year, but there wasn't enough seed to give everybody a chance. Now there is.

Pan-American is a beautiful tomato, smoothly round as a tennis ball, but with much more solid substance inside. In this respect it resembles one of its parents, the Marglobe tomato. However, it has the considerable advantage of being quite immune to the serious fungus disease known as wilt, that simply murders some kinds of tomato plants. To confer this immunity, Marglobe was crossed with a tiny-fruited but hardy wild currant tomato from Peru, then bred up for several generations to get the fruit back

to proper size. This addition of South American parentage was what suggested the name, Pan-American, for the new variety.

Long a favorite among bush lima beans is the Fordhook variety. It has choice quality, but is a finicky kind of plant, all too apt to yield only a scanty crop. A new variety, available in quantity this year for the first time, is known as Fordhook 242. It keeps the high quality of its temperamental parent but is much more prolific.

Another good new bean variety has been christened the Pioneer, perhaps because it is intended primarily for planting in the Northwest and Intermountain areas. It is a snap bean, borne on lustily growing bushy plants. Its great advantage is resistance to the curly-top disease, a destructive plague in the section where the Pioneer bean is to be grown.

This business of developing specialized varieties, good only in given regions, is

to a considerable extent replacing earlier efforts to produce garden crops that can be grown all over the map. The Pioneer bean is one example. Another is found in two new cantaloupe varieties, known so far only as No. 6 and No. 7, that originated in Texas and are good only in the irrigated Southwest. They are highly resistant to another destructive disease, powdery mildew, and have the marketable virtues of tempting flavor and scent, good size and compact shape.

Almost everywhere in the country, however, one variety of sweetcorn is scoring its triumph. It is Golden Cross Bantam, which has been out only a few seasons, but these have proved long enough to make it a prime favorite everywhere. As its name indicates, a strong parental strain is the old favorite, Golden Bantam; but the principle of hybrid corn breeding has been called in to improve its quality and make it an earlier crop.

There are a few other Golden hybrids that are even earlier, but for main-crop purposes it rules the garden now.

Plant breeders don't like to talk too much about what they'll have for us next year—too many slips between cup and



GARDEN PLANNING—Victory Gardeners find listed in the seed catalogues new varieties that last year they heard about but could not get because seed stocks had not been sufficiently increased.



NEW TOMATO—This Pan-American tomato, offspring of North America's Marglobe and South America's small-fruited but disease-resistant currant tomato, is one of science's best new offerings.

lip, perhaps. However, one excellent thing has been announced for 1946 by the U. S. Department of Agriculture: a variety of lettuce that resists the urge to "bolt" and go to seed when the weather gets warm, that overcomes all the present standard varieties, (See SNL, March 10). This will give us home-raised salads, even in July and August.

The new lettuce has been given the appropriate name Slobolt. The breeders have finished their work on it, and propagation gardeners will soon be boosting the quantities of seed, so that all seedsmen can offer it next spring.

Ingenious methods are used by plant breeders and seed propagators to speed up the production of seed and get the quantities needed for general use, a year or two sooner than the plodding calendar would ordinarily permit. For example, a choice new variety may yield a few scant handfuls of seed at the end of a late summer's growth in the greenhouses at Beltsville, Md.

Instead of having to wait until the following spring, they are flown out for planting in Arizona, where by April they have already come to maturity and increased to a few scores of pounds.

These daughter seeds again do not wait, but take another airplane trip, this time to the cool Northwest, where they go through another cycle of reproduction and increase, so that within one year (with good luck) there may be enough seed to permit the beginning of general distribution to gardeners.

Science News Letter, April 14, 1945

BACTERIOLOGY

Penicillin Kills Bacteria Within Cockroach Bodies

➤ **PENICILLIN'S** germ-killing capacity has recently been used in Harvard University's zoological laboratories, not for the benefit of the germ-inhabited individual but in an effort to solve a long-standing scientific riddle.

Prof. Charles T. Brues and Miss Ruth C. Dunn tell about the experiments in *Science* (March 30). In the cells of certain fatty masses in the bodies of cockroaches live certain bacteria-like organisms, passed on from generation to generation through the eggs. They are known technically as bacteroids. It has long been a subject of debate whether these germ-like creatures are parasites or symbionts—that is, whether they conferred any benefits on their insect hosts in exchange for the board and lodging they receive.

Prof. Brues and Miss Dunn first tried injecting solutions of various sulfa drugs into the body cavities of large cockroaches. Results of these early experiments were negative; the drugs apparently had no effect on the bacteroids. Then they used penicillin solutions, at high concentrations. This time the bacteroids died—and after anywhere from a day to a month, so did the cockroaches.

The two experimenters offer their conclusions with a note of caution: "We can not regard the present results as conclusive evidence that the bacteroids are necessary for the continued life of the cockroaches, but they make it appear very probable that such is the case and that they are symbiotic, and not parasitic, microorganisms."

Science News Letter, April 14, 1945

ELECTRONICS

Radar to Be Used for Tracing Migrating Birds

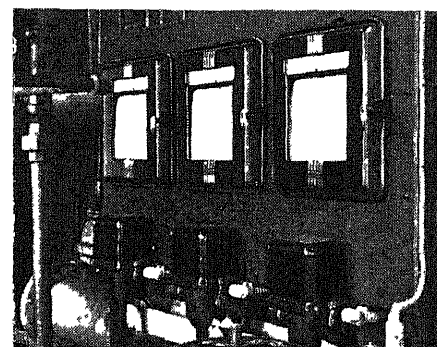
➤ **RADAR**, now used in tracking the deadly, fire-breathing birds of war, will in postwar times be put to the more peaceable task of following the migration flights of their feathered proto-

types. In *Science*, (March 30), Prof. Maurice Brooks of West Virginia University tells of his plans to use electronic equipment, installed on a high mountaintop in his state, to obtain data on the height, speed and direction of flight of wild geese, hawks and other birds large enough to register their presence on the radar screen.

Prof. Brooks states that he got the idea of using radar for this purpose from an ornithological friend who is at present a naval officer in the Pacific. The radar on his ship has often detected the presence of albatrosses, man-o'-war birds and other large species at ranges as great as five or six thousand yards, when the birds themselves were invisible. It is expected that peacetime bird-scouting with radar will gather much information hitherto unobtainable, especially about birds migrating at night or in hazy or cloudy weather, when visual observation is limited or even wholly impossible.

Science News Letter, April 14, 1945

Zakatalsk nuts, grown in Russia, are reported to have a vitamin C content about 40 times that of lemons, oranges and tangerines.



pH CONTROL SIMPLIFIED BY MICROMAX RECORDERS

Efficiency of water-treatment in the Arkwright Corporation's Finishing Division, Fall River, Mass., has been considerably improved since the former method of checking manually has been superseded by the three glass-electrode Micromax pH Recorders shown above. Now filter plant operators automatically obtain complete, accurate pH information starting with raw water which varies from 5 to 9 pH, including water at the alum-treatment point, and ending with finished water at 7 pH.

The instruments used are Strip-Chart Signaling Recorders . . . fully automatic; alarm operating. They record in great detail, on a range of 2-12 pH.

For further information, see Catalog N-96(1).

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Do You Know?

Wet laundry on the line will not freeze if a handful of salt is used in the rinse water.

The first description of *typhus* is found in an Italian manuscript written in 1083 A.D.

DDT-impregnated shirts are in use to protect soldiers against lice; they are effective for about two months.

The English *sparrow* was first imported into Brooklyn in 1851 to rid shade trees of inchworms.

Hulling *strawberries* before washing removes a protective outer tissue near the stem and causes a vitamin C loss.

Kovar, an alloy of iron, nickel and cobalt, expands with heat at about the same rate as hard glass and for that reason is used in electronic tubes.

Containers made of *cardboard*, impregnated and lacquered and lined with cellophane, are used in Germany for marmalade and jellies, it is reported.

Approximately 329,000,000,000 cigarettes were produced in the United States in 1944; over one-third were sent to military forces abroad, leaving for smokers at home about 38,000,000,000 fewer than they had in 1943.



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PSYCHOLOGY

Public Tolerant of CO's

Denunciation of conscientious objectors is not nearly so great as is generally supposed. Tolerance of them as individuals does not imply acceptance of their principles.

➤ PUBLIC denunciation of conscientious objectors is not nearly so great as is generally supposed, Dr. Leo P. Crespi, of Princeton University, found in a survey of public opinion reported to the Eastern Psychological Association in New York. Asked whether they would be willing to have a conscientious objector as a personal friend, the majority of those interviewed expressed no intolerance toward the CO as an individual. When asked what they believed is the public attitude toward CO's, however, the majority expressed the belief that the average person would not "want anything to do with CO's."

Tolerance of CO's as individuals does not imply acceptance of CO principles, it was found. There is no appreciable difference between men and women on either tolerance or approval of CO views.

Women Undecided

➤ WOMEN after the war may find themselves torn between the desire to remain in industry and business, sharing equally with men in job opportunities and community activities, and the desire to take a part subordinate to men in the home, if the conflicting desires of a group of college students can be considered as any index to what other women will want.

The survey of 147 women students was reported to the meeting by Dr. Georgene H. Seward, of Connecticut College, New London.

"Liberals" in their views towards the place of women are more feministic, but less feminine, Dr. Seward found. The liberals come from homes having less emotional security, and they are more anxious themselves, she reported. But she found no evidence that either liberals or conservatives would want to turn down the role of wife and mother.

Just Propaganda

➤ THE STORY of the "Black Hole of Calcutta," accepted as fact by the highest scholarly authorities and constantly circulated by psychologists, historians and other academic men, was actually only

a sample of early propaganda of the "atrocities story" type, Dr. George W. Hartmann, of Teachers College, Columbia University, told the meeting.

The original author of the story, Dr. Hartmann said, is demonstrated to have been a forger, a libeller, and a fabricator of other tales of extraordinary cruelty of similar style and content. The story itself is full of contradictions and assertions of improbable happenings.

Study of the story, however, reveals that the author made use of a dozen standard conditions by which the propagandist hopes to get people to believe such "atrocity stories."

Science News Letter, April 11, 1945

CHEMISTRY

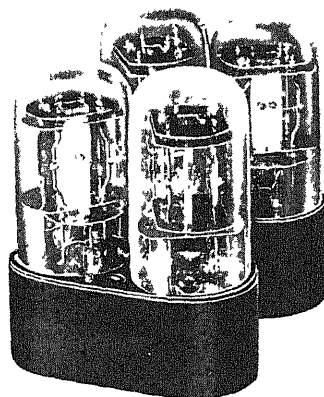
Scratch-Proof Coating For Noses of Planes

➤ YOUR POSTWAR flivver—whether it flies on wings or rolls on wheels—is likely to come to you tightly coated with a scratch-proof transparent film that can be easily peeled off. That is a logical peacetime extension to expect of U. S. patent 2,372,982, issued to A. B. Richards, J. A. Mickey and J. T. O'Reilly, all of Dearborn, Mich., and assigned by them to the Ford Motor Company.

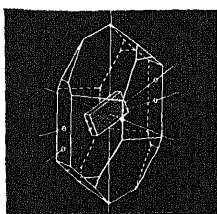
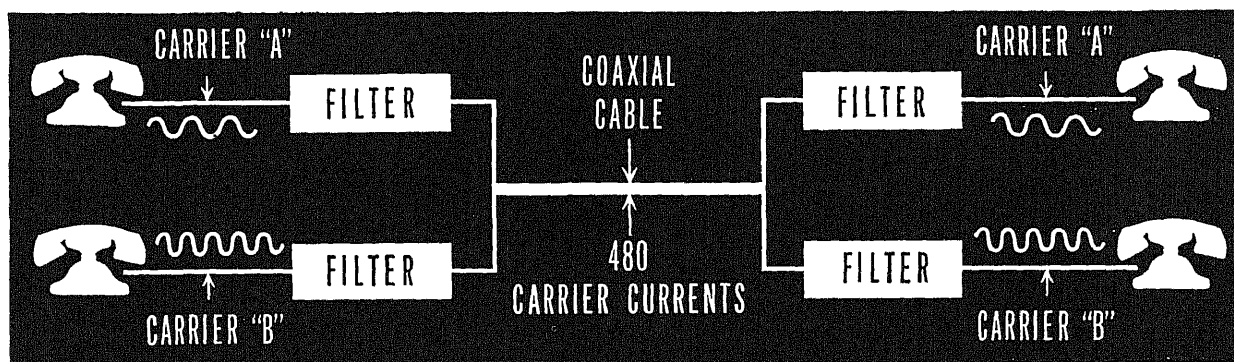
The protecting coating, now intended primarily for use on the transparent plastic noses and turrets of fighting planes, consists of polyvinyl alcohol dissolved in water, with small amounts of a chemical wetting agent and glycerin added. The parts to be protected are dipped in the solution, or the coating may be sprayed or brushed on. Once dried, it sticks tight, giving protection against rubbing and scratching; however, a slight break anywhere will permit ready peeling. A thread, tab or other device may be incorporated as a rip-starter. The solution may also be colored, so that the extent of its coverage can be seen at a glance.

Science News Letter, April 14, 1945

There is a probable *moose* population of at least 500 animals in the Isle Royale National park, situated in northern Lake Superior.



Crystal gateways for your voice



Four hundred and eighty telephone conversations over a coaxial cable was one of the last peacetime achievements of communication research in Bell Telephone Laboratories. In this multi-channel telephone system, each conversation is transported by its own high-frequency carrier current. At each end of the line are crystal gateways; each opens in response to its own particular "carrier" with the message it transports. In telephone terminology, these gateways are filters.

The ultra-selective characteristic of these filters is made possible by piezo-electric quartz plates, cut in a special manner from the mother crystal, and mounted

in vacuum. Each set of plates is precisely adjusted so that the filter responds only to the frequency of its assigned channel, rejecting all others. In the coaxial terminal equipment, such crystal gates sort out messages for delivery to their four hundred and eighty individual destinations.

In recent years, Bell Telephone Laboratories research has provided the Armed Forces with many types of electrical equipment in which frequency is controlled by quartz crystals. Notable is the tank radio set which enables a tank crew to communicate over any one of 80 different transmission frequency channels by simply plugging in the appropriate crystal. The future holds rich possibilities for the use of quartz crystals in Bell System telephone service.

BELL TELEPHONE LABORATORIES





The Twain Meet

➤ SOJOURNERS from the northeastern quarter of this country who happen to be anywhere in the Southwest when the desert's short period of blossoming sweeps over it like a miracle are apt to be astonished at the similarity between the flowers that burst out of the naked earth between the tough-leaved bushes and small trees of the chaparral and the flora they have known in the taller, denser wood-

lands of their more humid home states. Not only is there the same quick growth and flowering, the same delicacy of form and vividness of color, but many of the families and even genera can be identified as the same as those "back home": violets and buttercups, shooting-stars and wild lilies, geraniums and columbines, and a whole host of others.

This situation is not as "unnatural" as it might appear at first blush. For a little while in spring the desert relents a trifle in its ecological austerity, and at the same time the Eastern woodlands, not yet wholly redeemed from the grip of winter, have a whiff of the desert about them.

There are two principal factors in the dryness of a desert: scanty supply of water, and rapid evaporation of what moisture there is. But in spring the dry lands of our West and Southwest have the maximum of their year's short rations of water; where there has been snow, it has thawed, and there have been rains during late winter, lasting through March, and perhaps into April. So although the high evaporation rate persists, there is for the moment at least a fairly abundant supply of moisture in the soil. On the other hand, the Eastern woodlands are likely to be at least partly dried out by the ranging March winds, winter snows have vanished and spring rains have not yet become copious.

Above all, the evaporation rate in spring woods is higher than it is at any other time of year. The restless winds are one factor. Of perhaps equal importance is the warm sunshine, able to strike straight down through the still-bare branches of the trees and act on areas that it never reaches after the leaves have grown and closed the forest canopy. The network of twigs affords partial shade, to be sure, as well as a partial check to the winds, but probably not more than is offered by the scattered but mostly evergreen-leaved vegetation of the semi-arid Western brushlands.

These general considerations are borne out by actual measurements of evaporation rates in normally humid woodlands during the spring months. These rates are high until the leafy canopy is closed overhead, and then fall off rather abruptly. Thus there seem to be good physical causes underlying the springtime similarities in biological behavior between woodland and desert wildflower populations.

Science News Letter, April 14, 1945

CHEMISTRY

Corrosion Control Method Preserves Equipment

➤ MILITARY supplies and equipment can be salvaged without damage from sunken ships or left for weeks on island beachheads or in jungle outposts without the slightest damage from the elements, as the result of corrosion control methods developed by the Air Technical Service Command at San Antonio, Texas.

This corrosion control program, expected to save the government millions of dollars, preserves parts for airplanes from damage by the elements while en route to the war theaters. The program provides for applications of many kinds of rust-removing solvents and coatings with rust preventives, in addition to paper and wax coatings. The treatment is designed to prevent all types of corrosion and fungus growth for at least 18 months under any type of climatic condition.

Even microscopic fingerprint moisture contains enough acid to cause corrosion of highly polished surfaces, such as engine and precision parts. Special solvents applied by pressure or with a small brush eliminate the acid that in the past has caused great losses by rendering valuable supplies useless.

Science News Letter, April 14, 1945

Major mineral elements in plant growth are nitrogen, phosphorus, calcium, magnesium, potassium and sulfur; essential "trace" elements include iron, manganese, and boron.

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• Books of the Week •

➤ MUCH HAS BEEN LEARNED about the workings of the normal human mind through study of the exaggerated conditions present in various mental illnesses and abnormalities. Description and analysis of such conditions from the point of view of the psychologist rather than the physician concerned mainly with practical matters of treatment are found in somewhat technical form in a **TEXTBOOK OF ABNORMAL PSYCHOLOGY** by Roy M. Dorcus and G. Wilson Shaffer (*Williams and Wilkins*, \$4.).

Science News Letter, April 14, 1945

● Just Off the Press ●

AIRCRAFT ARMAMENT—Louis Bruchess—*Aerosphere, Inc.*, 224 p., illus., \$6.

THE BUILDERS OF THE BRIDGE, the Story of John Roebling and His Son—D. B. Steinman—*Harcourt*, 457 p., illus., \$3.50.

A MILLION HOMES A YEAR—Dorothy Rosenman—*Harcourt*, 333 p., illus., \$3.50.

THE PACIFIC ISLANDS HANDBOOK, 1944—R. W. Robson—*Macmillan*, 371 p., illus., \$4.

PSYCHOLOGY, PRINCIPLES AND APPLICATIONS—T. L. Engle—*World Book Co.*, 549 p., illus., \$2.12 A textbook for high schools and junior colleges.

THE RADIO AMATEUR'S HANDBOOK—The American Radio Relay League Headquarters Staff—*Am. Radio Relay League*, 512 p., paper, illus., \$1., 22nd ed

TAKE YOUR PLACE AT THE PEACE TABLE—Edward L. Bernays—*Gerent Press*, 60 p., paper, \$1.

TECTONIC MAP OF THE UNITED STATES, 1944—National Research Council, Div. of Geology and Geography, Comm. on Tectonics—*Am. Asso. of Petroleum Geologists*, \$1.75

TEXTBOOK OF ABNORMAL PSYCHOLOGY—Roy M. Dorcus and G. Wilson Shaffer—*Williams & Wilkins*, 547 p., illus., \$4., 3rd ed.

YOUR FORESTS—Martha Bensley Bruere—*Lippincott*, 159 p., illus., \$2.50.

Science News Letter, April 14, 1945

with the new flooring in tests at the Aberdeen Proving Ground, the floor bulged but remained intact, and the car rolled merrily along.

Science News Letter, April 14, 1945

ASTRONOMY

Star Shines Through Companion's Atmosphere

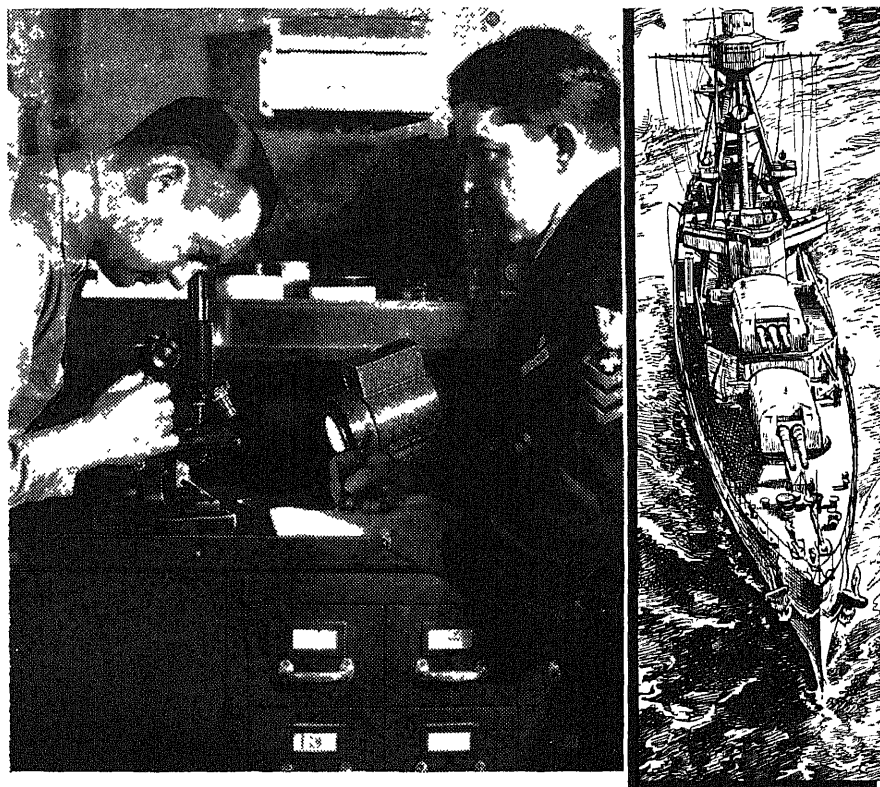
➤ LIGHT from the blue member of an eclipsing star team in the constellation of the Big Bear during eclipse shines through the outer atmosphere of its yellow-white companion. Only at mid-

eclipse can we see the yellow-white star, composed largely of calcium gases.

The diameter of the calcium star is twice that of its bluish helium companion star, Dr. W. A. Hiltner of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas reports in the *Astrophysical Journal*. The bluish star in turn has a diameter twice that of the sun.

A brilliant calcium line in the spectrum of TX Ursae Majoris is visible both before and after mid eclipse, Dr. Hiltner found

Science News Letter, April 14, 1945



A Spencer Microscope being used aboard a United States heavy cruiser.

ORDNANCE

Floor Just Bulges When German Land Mines Go Off

➤ DRIVERS of the Army's light armored military cars, and their assistants too, are no longer threatened with serious injury when a German land mine goes off underneath the vehicle. The secret is a new floor, shaped to fit over the front axle housing, which affords great protection against the dangerous enemy devices.

Developed by Army Ordnance and automotive engineers, the new floor consists of five sections of armor plate fully heat-treated to improve its physical properties. When German-type mines were exploded beneath military cars equipped

with the new flooring in tests at the Aberdeen Proving Ground, the floor bulged but remained intact, and the car rolled merrily along.

Every warship has its hospital—not only to treat battle casualties but to care for illnesses and accidents.

An indispensable item of equipment of course, is the microscope—used in clinical work, making blood counts, aiding in diagnosis, serving many laboratory needs

Spencer provides these and many other optical instruments for the U. S. Navy—including battleship turret gunsights, aircraft and anti-aircraft gunsights, turret periscopes,



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☼ **DRINK COOLER** and sipper is a combination glass device with an elongated container to hold a refrigerant material and a tube constructed in one side for sipping the liquid. When placed in a filled drinking glass it cools the liquid, particularly as it is sipped.

Science News Letter, April 14, 1945

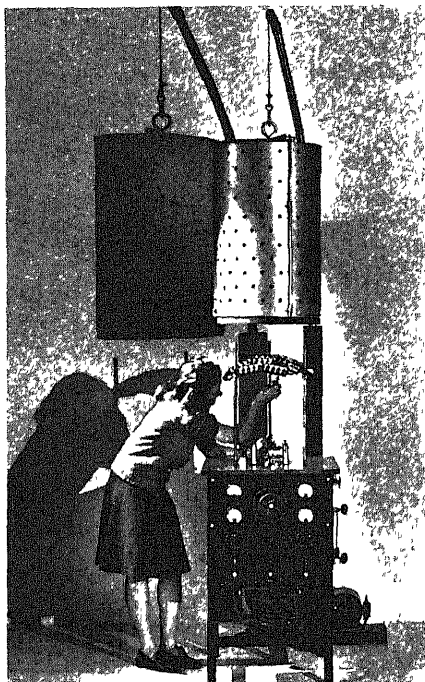
☼ **SORTING TILES** by color, electronically and automatically as they emerge from kilns on conveyor belts, is successfully performed experimentally. Cathode-ray oscilloscope and phototube convert a ray of light reflected from each passing tile into an electric impulse that shuttles it to the proper bin.

Science News Letter, April 14, 1945

☼ **ULTRAVIOLET** radiations are prevented from passing through transparent plastics, especially those of organic esters of cellulose, by a newly patented process. Certain cinchona or cinchona-like compounds such as the acid salts of quinine, quinidine, cinchonine or chinchonidine are added to the plastic.

Science News Letter, April 14, 1945

☼ **EVAPORATOR**, to produce films on all types of surfaces, is used in making mirrors by evaporating metals, such as aluminum, chromium, silver and gold, on the surface of glass. It is also used to apply low-reflecting surfaces to lenses in



field glasses. The picture shows its hood raised for loading.

Science News Letter, April 14, 1945

☼ **LIGHT PENCIL**, used to mark sensitized photographic surfaces, has within its opaque barrel a small dry battery, a light bulb separated from the battery with

a spring, and a projecting point of lucite or glass through which a narrow light beam may escape. Pressure on the point forces the bulb against the battery.

Science News Letter, April 14, 1945

☼ **PORTABLE** infrared unit, for use in industrial plants where quick heating of small machine parts is required, is a single infrared bulb in a reflecting shield, similar to some types of reading lamps, mounted by an adjustable arm on a portable stand. One use is to bake insulation vanishes on small motors.

Science News Letter, April 14, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 254.

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Question Box

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How much effort does flying eggs by air have on their hatchability? p. 232.

ASTRONOMY

Where are the five new white dwarf stars located in the sky? p. 232.

BACTERIOLOGY

How successful was penicillin for killing bacteria in the bodies of cockroaches? p. 235

BOTANY

When did the Japanese cherry blossoms in Washington, D. C. bloom? p. 232.

CHEMISTRY

How much vitamin A content may tomatoes have in the future? p. 233.

What is the new, simpler method for purifying penicillin? p. 233.

ELECTRONICS

How will radar be used to trace migrating birds? p. 235

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MEDICINE

How many pints of blood come from Fort Worth each week? p. 230.

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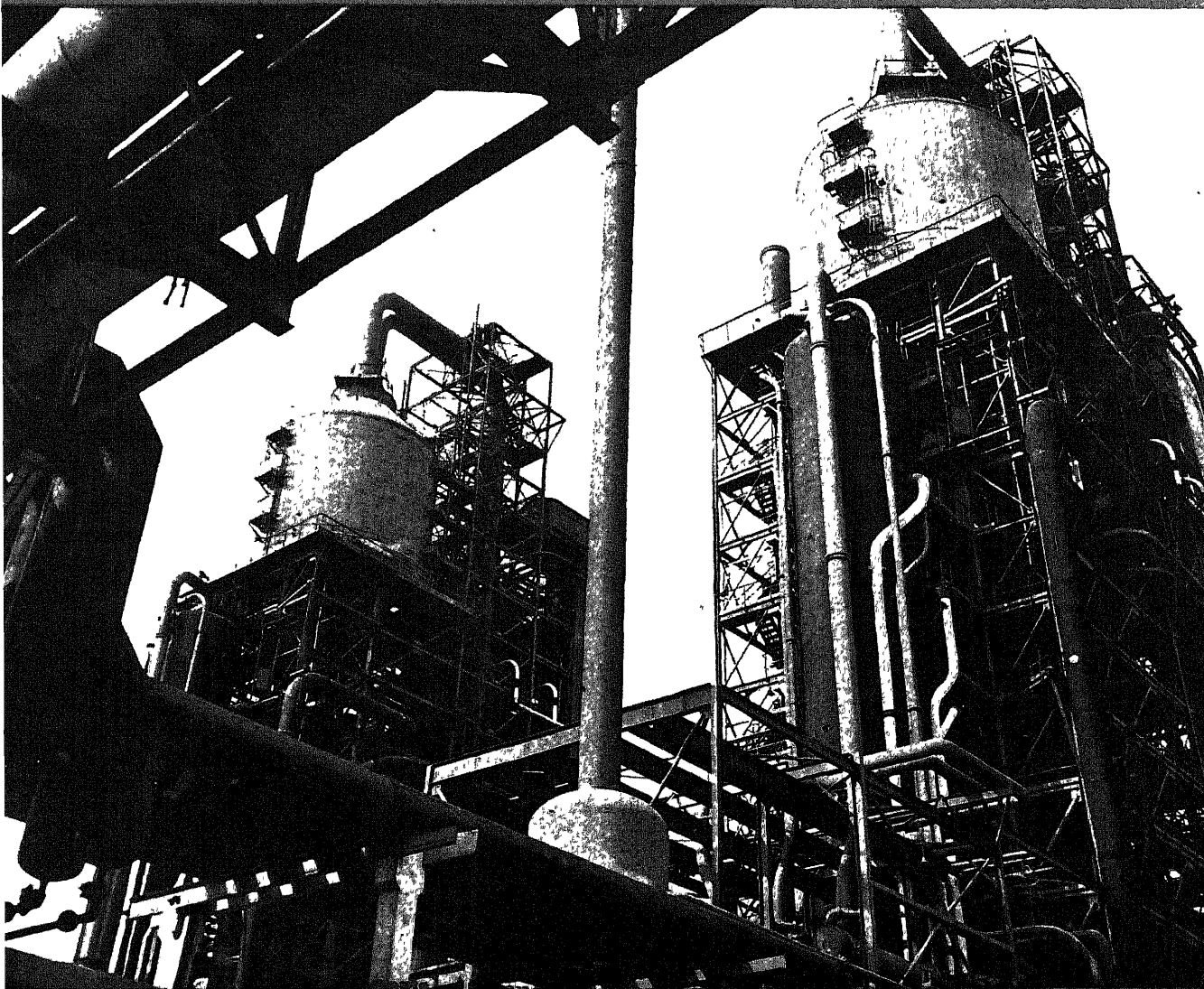
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SCIENCE NEWS LETTER



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Catalytic Cracker
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A SCIENCE SERVICE PUBLICATION

MEDICINE

Brain Hemorrhage Cause

High blood pressure and blood vessel disease are what produce this commonest of "cerebral accidents." May occur quite suddenly.

► BRAIN hemorrhage, from which President Roosevelt died, is the commonest of what physicians call "cerebral accidents." The layman calls it a stroke of apoplexy or a paralytic stroke, since paralysis on one side of the body often persists in patients who do not die of the hemorrhage.

High blood pressure and blood vessel disease are the chief causes of the condition. The exact mechanism by which vascular and arterial conditions, such as those leading to death from brain hemorrhage or from coronary artery trouble, terminate is not known. These blood vessels are where the strain comes. Undoubtedly many physicians, knowing the strain President Roosevelt had been under and the effects of such stress on the blood vessels of heart and brain in a man of his age, had been wondering how his would stand the strain.

The immediate cause of brain hemorrhage is a rapid rise in blood pressure. This may result from severe muscular exertion or from coughing or sneezing.

The immediate sequel of the hemorrhage into the brain is the apoplectic seizure, when the patient faints or loses consciousness. Most patients are said to have premonitory symptoms, as dizziness or a sense of pressure in the head. The patient may seem to be under low power. The seizure may, however, occur suddenly in a person in apparently perfect health.

Although paralysis often follows hemorrhage into the brain, there is no evidence at all that infantile paralysis has any connection with the kind following apoplectic seizure or that it predisposes to it directly. Indirectly it might add some strain through the burden of getting about with a physical handicap and the psychological burden of feeling disabled or being annoyed by the handicap. Counteracting this is the fact that in President Roosevelt's case much exertion could be avoided since people could understand his refusing to take part in many activities.

Science News Letter, April 21, 1945

PHYSICS

X-Rays Alter Wavelength

By irradiation with X-rays it is possible to regulate the frequency of quartz crystals used in radio. Changes reactivity also.

► PRACTICAL applications of a new basic discovery, in which X-rays and other radiations are used to alter the elastic constants and chemical properties of quartz and other crystalline substances employed in radio and radar oscillator-plates to regulate wavelength, were demonstrated to a group of scientists at the Reeves-Ely Laboratories by Dr. Clifford Frondel, head of the company's research division.

Another interesting application of X-ray found in the course of Dr. Frondel's work is its use in changing the color of many gem stones, and some colorless stones of little value may be given intense hues. Diamonds have been colored green and golden brown with deuterons, but the cost of the treatment is large

and the results frequently unpredictable, so that the method is not yet of much commercial value.

Dr. Frondel discovered recently that X-rays, and certain other types of radiation cathode, or electronic, rays and deuteron beams from a cyclotron, when allowed to pass through plates cut from certain crystalline substances, alter the mechanical strength of the material. There are accompanying changes in the color of the crystals, and their chemical reactivity also may be altered.

The X-rays or other radiation cause an interchange of electrons, Dr. Frondel explained, between the atoms composing the crystal and, by thus altering the interatomic bonding forces, change the elastic constants of the material. The

effect is similar to the action of visible light in blackening photographic emulsions.

The discovery is of great theoretical interest from the viewpoint of pure science, but has already been put to practical use in the war effort. Millions of tiny plates of crystalline quartz, the size and shape of postage stamps, are used by the armed services as oscillator-plates to control radio communications. The frequency at which the radio will transmit or receive, he reminded his hearers, is controlled, in common types of crystals, by the thickness of the plate. They are brought to proper thickness by mechanical means, and the process is an extremely delicate operation.

By using the new X-ray irradiation technic, oscillator-plates can now be adjusted rapidly and easily, he said, to a desired frequency with a precision hitherto impossible.

Irradiation with X-rays, he stated, also has been found to greatly modify the rate of solution and the chemical reactivity of crystals, and a whole new field of X-ray photochemistry is being opened up by his research.

Science News Letter, April 21, 1945

BIOCHEMISTRY

First \$5,000 Passano Award Goes to Biochemist

► THE FIRST \$5,000 cash award of the Passano Foundation will go to Dr. Edwin J. Cohn, professor of biochemistry at Harvard University.

Dr. Cohn's work on blood has resulted in isolation of five fractions now used in medicine and surgery. These are: albumin, now used to fight shock in the war wounded; immune globulin for protection against measles; fibrinogen from which is made fibrin film and fibrin foam used in surgery; isohemagglutinins for typing blood to be used in transfusions; and a fifth substance whose usefulness has not yet been fully exploited.

The Passano Foundation was established in 1944 by the Williams and Wilkins Company, medical publishers, to aid in any way possible the advancement of medical research, especially research that bears promise of clinical application. To encourage such research the award has been established as one of the Foundation's activities.

Choice of Dr. Cohn as first winner of the award resulted from a nationwide poll among leaders in medical science. Presentation will be made on May 16.

Science News Letter, April 21, 1945

Science For Peace -- Roosevelt

No more timely pronouncement for the future has been written than these undelivered words of Franklin Delano Roosevelt, prepared for radio delivery on Jefferson Day, and released for publication after his death. This excerpt is printed in commemoration.

But the mere conquest of our enemies is not enough.

We must go on to do all in our power to conquer the doubts and the fears, the ignorance and the greed, which made this horror possible.

Thomas Jefferson, himself a distinguished scientist, once spoke of "the brotherly spirit of science, which unites into one family all votaries of whatever grade, and however widely dispersed throughout the different quarters of

the globe."

Today, science has brought all the different quarters of the globe so close together that it is impossible to isolate them one from another.

Today we are faced with the pre-eminent fact that, if civilization is to survive—we must cultivate the science of human relationships—the ability of all peoples of all kinds, to live together and work together, in the same world, at peace.



WIRE DISPENSER—New equipment by which combat wire in coil form may be laid by airplane or vehicles or paid out by bazookas and rifle grenades without the use of reels, has been developed by the Signal Corps. An important advantage of the method is the fact that wire can be laid manually by mountain, ski or ground troops without the use of reels or auxiliary equipment.

MILITARY SCIENCE

New Weapons for May

That is when the Japs will feel the force of many new devices developed by the Army with the aid of OSRD and NIC. Mines are radio-controlled.

➤ FOR THE little men of the Mikado's armies the expression "Beware of the Ides of March" might well be changed to "Watch out for new American weapons in May". It is in May that the Japs will begin to feel the full force of many new weapons, until now secret, to be used by the Army Service Forces. On Iwo Jima they got the first taste of 7.2-inch chemical rockets fired at intervals of 3/10 of a second from a new 24-tube rocket launcher that can be mounted on the back of a truck; soon the Nips' jet-propelled planes will be shot down with a new vibrationless computing gunsight that can direct gunfire on a plane moving 700 miles an hour and a new 105 millimeter gun, the biggest caliber gun using a completely assembled shell, will hit targets as far as 27,000 yards away at the rate of 20 shots a minute. The gun can be pointed by handlebar controls.

Enemy guns, well hidden by clumps of trees or behind bushes, can now be ferreted out by a new sound locator for enemy mortar and machine gun emplacements that can spot a gun in the under-

growth better than a good hunting dog can spot a partridge. Weighing only 45 pounds so that it can easily be carried, the self-contained direction finder consists of a highly directional microphone, that picks up the sound of gunfire anywhere within 1,500 yards and transmits the location of the gunfire to the screen of a cathode ray tube where an arrow-like line appears pointing to the location of the gun. To further assist gunners, the screen is graduated in mils, making possible precision shooting.

All of these devices were developed by the various divisions of the Army Service Forces, with the aid of industry, and such government agencies as the Office of Scientific Research and Development and the National Inventors Council.

Soldiers now just dial the enemy's number when the Axis attacks across one of our mine fields, using a new radio-controlled mine detonator that eliminates wire-connected devices. The system consists of a radio control panel on which a dial, similar to that used on telephones, is mounted. In the mine field itself, ex-

pendable radio receivers are attached to each of our mines, each set to electrically detonate the mine when a pre-determined number is dialed on the control panel. The whirling flail chains of enemy tanks can beat the earth over one of our land mine fields or they can shoot it full of rifle bullet holes without setting off one radio-controlled mine. Then when the Japs think the field is clear, and they send in their troops, the Corps of Engineers start dialing numbers that set off the mines, resulting in heavy enemy casualties. The same system can be used for mines in water.

Moving targets are no longer a problem to bazookiers, now that the bazooka has been equipped with a new type of sight that is larger and permits better vision than the type formerly used. The bazooka is lighter in weight, four pounds less than before, now that the tube is being made of aluminum alloy and designed for better balance. The weapon is split in two parts for easier carrying.

Still another rocket launcher will unleash 24 4.5-inch rockets in 12 seconds against an enemy as much as 5,250 yards away, hitting with a blast that is better than a 105-millimeter shell. Set off by an electric spark, the rockets can carry either

high explosives or chemicals. The launcher itself is mounted on a two-wheeled truck, and the rockets are muzzle-loaded into three banks of eight rockets each by a five-man crew. The rockets themselves are spinners, each having eight vents in the tail set at an angle so that when the hot gases escape they cause the rocket to spin. This spinning motion stabilizes the rocket in flight and takes the place of fins or rudders.

Completing the line of shells for use with the popular 105-millimeter gun, the Ordnance Department has developed a new flare for turning night into day. Shot high in the air, it automatically ignites a mixture of magnesium flakes in asphalt and suspended by a parachute contained in the shell, it descends at the rate of 35 feet a second. The flare burns brightly for 43 seconds.

So that airmen can easily see smoke signals which might otherwise be hidden by trees, a new smoke flare has been developed that can be shot from a standard rifle launcher above the tops of trees. When it falls the smoke grenade hooks onto the branches of tree-tops, where the smoke continues to pour forth, giving a signal that can readily be spotted from an airplane.

The Signal Corps has lifted the veil of secrecy from two of its electronics devices. The first is a lightweight mobile unit that controls the movement of anti-aircraft searchlights. Three operators, viewing as many meters, get the range in yards, altitude in feet and elevation in miles of any enemy airplane. The antennae, looking like an enlarged version of a cone-shaped portable electric heater used in homes and offices in winter, rotates at seven revolutions a minute on

top of the movable detecting control box. The searchlight, which may be many feet from the set, is synchronized with the antennae so that when the set picks up the enemy plane the searchlight also spots it.

The waves that are sent out, hit the target, and bounce back to the receiver, revealing the location, are responsible for the detection of aircraft up to 110 miles away in a new portable electronic device for use on beachheads. Weighing only 450 pounds complete, and powered by a gas-driven generator that produces two kilowatts, the set is rigged up on a beach, and operators see planes on the calibrated screen as bright blobs of light. Once a plane is spotted, American guns shoot it down.

Not all the new equipment revealed for the first time is designed to deal death to our enemies. The ice cream "casket", for example, turns out 3,000 half-pints of rich ice cream in three hours to give our fighting men a refreshment they enjoy. It takes only six minutes to produce 2.5 gallons of ice cream. A completely self-contained unit, it not only manufactures ice cream but stores it in a big 40-gallon cabinet. Casket-like bars along the sides of the long box make it possible for 12 "pallbearers" to carry the unit.

Railroad locomotives are now shipped by air, boxed in nine packages and weighing 35,000 pounds. Already in use in Burma on the Mitchener to Rangoon rail line, the pint-size locomotives can pull seven standard freight cars at 12 miles an hour on level track. A four-cylinder gas engine develops 35 horsepower. There are four speeds to choose for operation.

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of Medicine, St. Louis. So they sought for one and last fall they reported finding the virus of St. Louis encephalitis in mites collected from chickens in the St. Louis area.

Now Dr. Sulkin, following up that report, finds the Western equine encephalomyelitis virus in chicken mites. These blood-sucking relatives of spiders and ticks apparently pass the viruses of at least two kinds of encephalitis from chicken to chicken, to keep alive the dangerous reservoir of the disease.

Science News Letter, April 21, 1945

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MEDICINE

Mites Carry Disease

► THE VIRUS of equine encephalomyelitis, popularly known as horse "sleeping sickness," has been isolated from chicken mites by Dr. S. Edward Sulkin, of Southwestern Medical College. The discovery helps solve some of the mystery of how this disease spreads. (*Science*, April 13)

Both Western and Eastern types of the horse encephalitis virus attack humans, sometimes fatally. Antibodies to these viruses and to that of St. Louis encephalitis, epidemic in the human population of that city some years ago, have been found in the blood of chickens. The

presence of the antibodies shows that the fowl were infected by the virus.

Mosquitoes and ticks are known to be capable of carrying the virus and mosquitoes are believed to be the agents that spread the disease among humans. Barnyard fowl apparently constitute a reservoir of infection, but scientists have wondered what kept the infection going among the chickens between epidemic periods.

A blood-sucking vector which does not bite man, was the answer that occurred to Dr. Margaret G. Smith and associates of Washington University School

CHEMISTRY

Waterproof Matches

Developed for use of troops in tropics and on beachheads, they will light after being soaked in water for eight hours.

➤ MATCHES which will light after being soaked in water for eight hours have been developed for the use of our troops in rain-plagued tropics and for beachhead operations.

The matches look like ordinary kitchen matches and, if the box in which they come is lost, will light when scratched on a stone or a shoe. The formula for the transparent, heat-resisting coat which makes the matches waterproof has not been made public, but both this and the manufacturing process, which makes it possible to produce cheaply these matches in large quantities, have been made available to the government by the Diamond Match Company for the use of competitors.

Announcement of the creation of successful waterproof matches has been withheld for more than a year for military reasons. Production began on the second anniversary of Pearl Harbor, and more than 10,000,000 matches are being manufactured each day at Oswego, N. Y. The new matches have been in use in the southwest Pacific and in India since early 1944.

Most of these matches, which can withstand innumerable drenchings, are shipped to the Army, Navy and Marines in the same size as ordinary strike-anywhere matches. Large quantities, however, have been made in midget size for emergency kits. Midget matches are one and one-sixteenth inches long, half the length of the kitchen match, and are intended as part of the equipment for life rafts and for airmen forced down at sea.

The search for a practical waterproof match has gone on intermittently for more than a century since the first waterproof match—which proved unsuccessful—was patented in 1837. Early attempts involved the use of varnish or Irish glue. While they succeeded in producing match heads which disintegrated more slowly in regions of high humidity, the matches could not be submerged in water for any length of time or repeatedly soaked without losing their efficiency.

The first real step toward the waterproof match came in 1911, when William A. Fairburn, then chief engineer and now president of the company, de-

veloped a formula which substituted sesquisulphide of phosphorus for the phosphorus which had been used for nearly 80 years in matchmaking.

The phosphorus was easily affected by moisture and was highly poisonous. The Fairburn formula, which Diamond gave to its competitors to protect the lives of workers and consumers, made the matchhead more resistant to water and to humidity.

This formula was revised about five years ago at the request of the U. S. Army to make matches for troops stationed in Panama where the long rainy season makes ordinary lights useless. While the Panama match was not waterproof, it had enough cohesiveness to keep it from falling apart in wet weather and it would light after soaking if carefully dried.

When it became apparent that a great part of the present war was to be fought in swamp or ocean, and from foxholes filled by rains, a request came from the

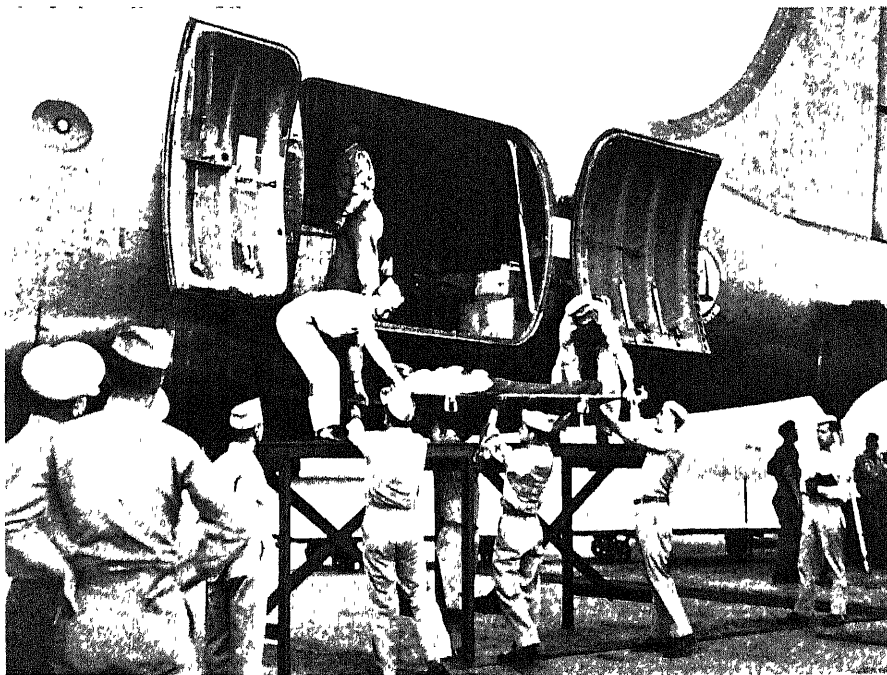
Quartermaster General for a match that would survive drenchings when troops waded ashore from landing crafts and function after being stored in damp climates.

The formula for a waterproof coat was developed by Raymond D. Cady, chief chemist, but problems of manufacture arose. The coating was to be applied to kitchen matches, which are normally given five baths and dips during manufacture to prevent afterglow, insure ready ignition and put the bulb and eye on the splint of wood. Waterproofing meant an additional dip and necessitated revision of the giant machines that make matches on an endless chain.

It was also discovered that if the matches were dragged through a bath of waterproofing, as in other processes in the manufacture of matches, they were not really waterproof. The fluid was so thick that the wake created by passage of the matches would not close up in time to protect the rear of the matches. Hanging upside down from plates, the matches are now plunged vertically into the bath.

The ordinary kitchen match takes 60 minutes to manufacture, from block of wood to box, while 90 minutes are needed to make the waterproof match. The same number—over a million—are manufactured each hour.

Science News Letter, April 21, 1945



SKY AMBULANCE—American casualties are being unloaded from this C-47 after swift flight from Saipan to Hawaii. Air evacuation of wounded is described by military officials as one of the five greatest lifesaving measures of modern military medicine. Official U. S. Army Air Force photograph.

GENERAL SCIENCE

Confidence Necessary

Civilization depends upon continued international trust and cooperation among scientists of all free nations after the war.

Sir Henry Dale, president of the Royal Society of London, and Dr. Frank Jewett, president of the National Academy of Sciences, joined voices on April 14, as guests of Watson Davis, director of Science Service, in international broadcast on the CBS program "Adventures in Science," discussing the future of science after the war when the policy of secrecy can be abolished. In his introduction Mr. Davis said:

"On this day of national mourning for a great President, it is altogether fitting that we look forward to the future and its problems—problems that Franklin Delano Roosevelt did so much to solve. It is a fitting day for scientists of nations united for freedom to plan to put science at the service of our future now being won so surely and with such cost—a future to which our late President gave his all."

By SIR HENRY DALE

President, Royal Society of London

► WITH VICTORY in both sides of the world now so clearly in prospect, we acknowledge first with sorrowing pride our measureless debt to the sacrifice, courage and skill of all our fighting forces of our great alliance, but doing so, we should not forget all their heroic devotion might have been in vain if men of science had found no effective answer to the preparations which enemies to our freedom had for years been making in secret, perverting science from its proper aims to build their plans for our destruction.

Full Mobilization

Our United Nations have been able to meet this menace only by full conscription of all our scientific resources for war in defense of our common hopes and ideals. All played their part. In the scientific and technical triumphs Soviet Russia vied with the Red Army's tremendous achievements in battle. We men of science in Britain can never forget that long before the United States came into open alliance with us at a time when we stood alone in desperate need and danger, your men of science already had joined hands with ours in brotherhood and intimate collaboration. This became ever closer and more fully organized as all the joint resources of the United States and the British Commonwealth were being devoted to the defeat of our common enemies.

Some day it will be possible to make clear the details of the contribution which this scientific fellowship of the English speaking peoples made to defeat the German and Japanese attack on the world's freedom.

Now as we breathe again more freely, men of science may well begin to look beyond the end of the war and consider which of its lessons they can carry forward into peacetime in which science returns to its proper and beneficent aims. Many discoveries and inventions which war promoted will find ready and even startling applications in peacetime. Safety and speed of transport about the world; the idea of making machinery fit for man instead of expecting man to adapt himself to machinery; control of insect pests, treatment of tropical diseases, and wound infections, the uses of penicillin and its production for world needs—about all these, the collaborative effort stimulated by urgent demands of war have taught us more than we might have learned in decades of peace. And these are merely a selection of things which can already be mentioned.

Strengthen Cooperation

Is it not clear then, that there is one thing above all others which must carry forward from our wartime scientific experience into the times of peace—a spirit of close comradeship between the scientists of our two nations. Surely we must cherish and strengthen this with every influence we can bring to bear as one of the most beneficent by-products which war can offer in mitigation of the disasters it has inflicted.

I think we should beware of any tendency to perpetuate in peace the wartime restriction of this comradeship in science to English-speaking peoples. No special knowledge is needed or unusual gift of inspiration to see that the future of our civilization may well depend upon our success in spreading and establishing among scientists of all free nations a spirit of confidence and frank cooperation such as the urgency of war's demands have fostered between those of our own. Experience must show how much we can usefully retain, in peace, of the organizations which our nations

evolved in war to facilitate our joint effort. But whatever we retain must be purged of the secrecy which for men of science has been among war's repulsive necessities. In any case it is not organization alone which will count for the future of the world, but rather the spirit and determination with which we strive to build a new world community of men of science working with a united purpose for the good of all mankind.

By DR. FRANK JEWETT

President, National Academy of Sciences

► ALL men of science, both fundamental and applied, in the United States will subscribe wholeheartedly to Sir Henry Dale's opening sentence. We do acknowledge with sorrowful pride our measureless debt to the sacrifice, courage, skill and devotion of our fighting forces of the far-flung battle fronts of land, sea and air. This is poignantly true today when we here in the United States are in deep mourning at the sudden death of President Roosevelt. He was not only the commander-in-chief of our armed forces but more was our most valiant leader in the fight for the preservation of all that we cherish of the things that go to make up a decent world in which free men and women can live decently and happily. He gave his life for a great cause just as truly as have the millions who have died for it in battle or by bombing; the horrors of prison camp or the inhuman cruelties of a depraved and degraded philosophy. Further, we are not unmindful of the fact that much which he and they have been able to accomplish by way of bringing this dreadful scourge toward a successful conclusion was made possible by the contributions of men of science. Many of these contributions and those who made them will never be widely known. Nor are they ever likely to be widely acclaimed. They lack the glamour of a flaming battle line and in most instances the appeal to sympathy and compassion which accompany death, and the suffering of wounded or stricken men.

To those of us who have been participants in the United Nations battle of science, several things stand out with crystal clarity and are a hopeful omen for the future of that peaceful way of life we have sought to preserve against the onslaught of the totalitarian powers which have sought to destroy it and us.

Adaptability Important

First is the unanimity with which men of science have rallied to its defense and their willingness to do whatever task

there was to be done and at whatever it entailed of personal inconvenience or sacrifice. Second, their adaptability to the urgent conditions of war—fundamental scientists abandoning for the time the quiet of their laboratories and their scholarly quest for new items of knowledge to become the most practical of industrial research men or engineers. Third, the evidence everywhere of the breadth and soundness of scientific training in a world of free intercourse in a society of free men—chemists becoming physicists; biologists taking on the creative work of chemists; mathematicians making great contributions in fields which yesterday were *terra incognita*. Finally we have had demonstrated as never before the power for achievement which resides in scientific teamwork when organized on a huge scale and with each participant intent on a single objective.

Sir Henry has mentioned some of these achievements. There are legion others. While, as he pointed out, much that has been done will benefit us in the years ahead, it is sad to contemplate how much we have been forced to do by way of

destroying in order that we may insure a decent world for our children.

Our hope is that we of science in the postwar years can profit from what we have learned in war and make of science a far more powerful instrument for good living than we have ever known. We certainly can if we have the courage and will to do it; if we can find a way to preserve fruitful cooperation without retention of the shackling restraints of a wartime necessity. To do this, men must be free not only to act and speak but more, free to think.

The task ahead is a hard one. Whole sectors of fundamental science have been essentially neglected for more than half a decade. Advanced training has ceased and what is even worse, the stream of broad undergraduate instruction has practically ceased to flow. It will take time to rectify these deficiencies and insure to us a balanced harvest of scientific fruit.

It is not an impossible task, however. Rather it is a matter of the spirit and of belief in the value of science which will lead men of good will to work together in peace as they have in war.

Science News Letter, April 21, 1945

MEDICINE

Eye Bank Started

From ten to fifteen thousand blind persons may see again by drawing corneas deposited in this unique institution.

➤ FROM 10,000 to 15,000 blind persons in the United States may have a chance to see again through the activities of the Eye Bank for Sight Restoration, Inc., New York, the organization states in announcing its incorporation and officers.

Those who will benefit will be persons blind because of defects in the cornea of the eye. The cornea is the transparent tissue in front of the eye lens. As far back as 1789 surgeons have tried to relieve this type of blindness by substituting transparent material such as a piece of glass for the cornea that had become opaque.

In recent years successful methods of grafting corneas have been developed, but lack of corneas for grafting has been a handicap. The material may be taken from a living or a dead person but must be used within a short time after removal.

Efforts to obtain a supply of corneal tissue for the transplantation led in 1941 to formation of the Dawn Society under the sponsorship of the International Order of Good Templars. Members of the

Society pledged their eyes at death to this society for the use of the blind.

An Eye Bank was established at the New York Hospital last year. The newly formed Eye Bank for Sight Restoration is national in scope and is affiliated with 22 leading New York hospitals.

"The purpose of the Eye Bank," its executive director, Mrs. Henry Breckinridge, states, "is to make available a supply of fresh or preserved corneal tissues wherever and whenever needed by hospitals and surgeons who are qualified to perform the corneal graft operation. We also plan to extend, through scholarships and fellowships, the knowledge and skill required."

"One of our most important objectives will be to discover a method for preservation of the corneal tissue over a longer period of time than is now possible. At the present time, the corneal tissue taken from a living or dead person may be stored for only three days before it is transplanted."

The 20 ophthalmologists who are serv-

ing in an advisory capacity are: Lt. Col. M. Elliott Randolph, Valley Forge, Pa.; Harry S. Gradle, Chicago, Ill.; Alan C. Woods, Baltimore, Md.; Theodore L. Terry, Boston, Mass.; William L. Benedict, Rochester, Minn.; Lawrence T. Post, St. Louis, Mo.; Col. Derrick Vail, Cincinnati, Ohio; Dohrmann K. Pischel, San Francisco, Calif.; Edmund Spaeth, Philadelphia, Pa.; Cecil S. O'Brien, Iowa City, Iowa; Purman Dorman, Seattle, Wash.; R. Townley Paton, David H. Webster, Herbert B. Wilcox, John M. McLean, John H. Dunnington, E. Clifford Place, Daniel B. Kirby, Conrad Berens, Ernest L. Stebbins, all of New York City.

Science News Letter, April 21, 1945

CHEMISTRY

Common Salt Used in Making Ethyl Chloride

➤ ETHYL CHLORIDE, the chemical used to make tetraethyl lead that takes the knock out of gasoline, will soon be in production by a new process in a plant under construction in Baton Rouge, La. The process, developed by the Ethyl Corporation, yields ethyl chloride by reacting chlorine with waste products from one of the corporation's other ethyl chloride plants, also located at Baton Rouge. The chemical has many uses in addition to its service in gasoline and in high-octane aviation fuel, several of which are connected with the war effort.

The chlorine for the new process is produced by breaking common salt electrically into its two parts, sodium and chlorine. The sodium produced is used in the manufacture of tetraethyl lead after it is combined with metallic lead to form a lead-sodium alloy.

The two previous processes for producing ethyl chloride are based on the hydrochlorination of alcohol, and on the hydrochlorination of ethylene. These materials are both in the shortage category because of the tremendous demand for them in making detonating powders, butadiene for synthetic rubber, and other war essentials.

Ethyl chloride is used in dentistry as an anesthetic on abscessed gums, and for general anesthesia in short operations, with the advantage of no after-effects. Chemical applications include production of ethyl cellulose, which is the basis for certain plastics, and catalyzing synthetic rubber. It is also used as a constituent of cognac essence, and sometimes in mechanical refrigerators as a refrigerant.

Science News Letter, April 21, 1945

BIOCHEMISTRY

Anti-Germ Activity Found For Anti-Clot Chemical

➤ DICUMAROL, anti-blood clotting substance, also possesses marked anti-germ activity, Dr. Andres Goth, of Southwestern Medical College, reports. (*Science*, April 13)

Growth of staphylococci, streptococci, anthrax bacilli, undulant fever germs and diphtheria bacilli was stopped by dicumarol.

The anti-germ activity was not stopped by chemicals with vitamin K activity which do block the effect dicumarol has in slowing blood clotting.

Dicumarol was first isolated from spoiled sweet clover. If it could be shown that the spoilage of sweet clover was due to the action of microorganisms, Dr. Goth points out, it would be possible to consider dicumarol one of the naturally occurring antibiotics, such as penicillin.

Science News Letter, April 21, 1945

PSYCHOLOGY

Research Aim to Find Way of Picking Officers

➤ A COMBINATION of Sir Galahad and General Lee who looks like Douglas MacArthur.

This is the picture of the ideal officer, as viewed by high-ranking military men, Prof. Henry E. Garrett, of Columbia University, told fellow psychologists in his presidential address at the meeting in New York of the Eastern Psychological Association. Occasionally, he said, an officer will recall an efficient company officer who was unprepossessing in appearance and not highly gifted in personality, but he was regarded as an exception.

Prof. Garrett has been testing this romantic picture against the hard reality of successful combat officers who have distinguished themselves in the field in this war, he reported. The following picture, the study shows to be nearer to an accurate portrait of officers selected by company commanders from 14 different divisions as "best."

He is between the ages of 23 and 29 (neither very young by Army standards nor very old). He has three years or more of college training and in civilian life was likely to have been a professional man or preparing for a professional career. His academic rating in school may have ranged anywhere from very good to poor, but in leadership ability he was in the first half of the class. He has been

an officer for somewhat more than a year. He has a medium GCT (General Classification Test) score—between 120 and 140.

The worst combat officer—also as selected by company commanders on the basis of actual performance in the field—is likely to have attended only high school or grammar school. His GCT score may be low, medium or high, but he is more likely to have a score below 120 or above 140 than is the best officer. He may have had school marks anywhere from very good to very poor, but in rating on leadership he was in the low half of the class. He has been an officer less than a year.

Ratings by superior officers of both best and worst officers revealed some interesting differences between them. Best officers are rated very high or high in each of six traits. Worst officers are rated poor or very poor on the same traits.

Physical ability is the trait on which the greatest difference between best and worst occurs. Knowledge of the job, control over men were next best for distinguishing the two groups. Then followed relations with other officers and emotional steadiness in combat situations and finally personal habits such as irritating or pleasant ways.

Science News Letter, April 21, 1945

WILDLIFE

Bobcats Aid Farmers by Helping Control Rabbits

➤ BOBCATS aid farmers and sportsmen by helping control rabbits, porcupines and certain small mammals; they seldom harm deer or ruffed grouse, Clair T. Rollings, University of Minnesota zoologist, reports. (*Journal of Wildlife Management*, April)

Bobcats usually catch their prey either by creeping behind cover or by patient waiting, crouched atop a log, stump or other vantage point, until the prey chances to pass on a nearby trail.

The varying hare ranks first among the bobcat's food. Porcupines are also frequently eaten. Birds are seldom sought and deer only occasionally attacked. Most of the venison that bobcats get comes from animals that are already dead from other causes.

During the past 10 or 20 years, the northern limit of the region over which bobcats range has extended 100 to 200 miles to include southern Ontario. Bobcats used to range over almost the entire eastern half of the United States, from North Dakota to Maine and Georgia.

Science News Letter, April 21, 1945

IN SCIENCE

ENGINEERING

Shape and Size of Cams Determined by New Method

➤ CAMS ARE machine parts now familiar to millions of workers in war plants. Those non-circular or eccentric rotating flat pieces of metal, which change rotary to reciprocating motion, need no longer be guess-pieces in design or developed by cut-and-try methods. An exact and mathematically correct method for determining their correct shapes and sizes is now available.

This mathematical method was worked out by two members of the faculty of Cornell University, W. B. Carver, professor of mathematics, and Bavard E. Quinn, instructor in machine design. It is exact to at least 1/100,000 inch.

Present methods of determining the shape and minimum size of the cam are based on drawings which involve a certain amount of the trial-and-error method. The new method consists of using mathematical equations to determine the minimum radius of the cam, and to find the closed curve which just touches the follower as the follower goes through all the desired positions during one revolution of the cam.

Science News Letter, April 21, 1945

PUBLIC HEALTH

Polio Cases Number Higher Than in Five Years

➤ INFANTILE PARALYSIS cases have been persistently higher so far this year than for any of the five past years at this season. The number reported to the U. S. Public Health Service from the first of the year to the week ending April 7 is 484. Highest figure for the same period during the last five years was 377 in 1940.

Although it is too early to predict what will happen when summer, the infantile paralysis season, arrives, the next few weeks may tell whether another epidemic is on the way.

Of the year's total so far, about one-fourth of the cases have been reported from New York State. The rest have been scattered throughout the country.

Science News Letter, April 21, 1945

E FIELDS

INVENTION

Push-Button Vacuum Jugs Used at High Altitudes

➤ A NEW airtight vacuum beverage jug for postwar airliners makes possible the serving of thick soups, carbonated beverages like ginger ale, and all kinds of fruit juices at high altitudes. This has not been possible up to now because present-day containers are not airtight and the spigots would not permit liquids heavier than coffee or broth to pass.

The new container which will enable an airline to serve liquids of any consistency, degree of temperature, or carbonation at altitudes of 20,000 feet and above was designed by Walter Y. Brown, assistant superintendent of ground service for Transcontinental and Western Air Lines, according to a report in *American Aviation*.

The airtight beverage jug assures the maintenance of constant pressure on the liquid content regardless of altitude change. Thick soups can be dispensed four times as fast as the present rate for other types of spigots by a special push-button spigot on the jug. Five of the new containers will replace the eight half-gallon and two one-gallon containers now carried on commercial airliners.

The interior of the new jug is made of stainless steel with a high luster finish that makes it easy to clean. All seams are electrically welded, for sanitation.

Science News Letter, April 21, 1945

AERONAUTICS

Light That Burns for Year Warns Planes of Peaks

➤ A NEW beacon light that will burn for a year without adjustment or refueling and that can be seen for about 12 miles has been developed by the Army Air Forces as a warning light for planes. It is to be placed on the peaks of high mountains and near other hazards located in isolated areas. It may be used as a civil airway marker after the war.

Known by the code name Type C-3, the new light is an acetylene-burning lantern designed for installation where electricity through power lines is not available. In operation a 400 candlepower beam is flashed for two-tenths of a second, 30 times a minute. Upper and lower

lenses are fitted with red filters to throw the light in a complete 360-degree circle so that it can be observed by pilots from any direction.

The main burner has a three-cluster flame ignited by two constant pilot lights. Tiny holes in the base of the apparatus permit enough air to get in to keep the flame going. A baffle system prevents the light from being blown out by high winds.

The beacon is controlled by a sun-valve device which consists of four metal rods that are sensitive to light. These rods expand and contract when the outside light varies, and have a compensating device to take care of temperature changes. The expansion and contraction of the rods produces energy to operate the valve which governs the flow of fuel to the main burner.

Science News Letter, April 21, 1945

POPULATION

Nine Out of Ten Americans Now Born to Native Parents

➤ NINE out of every ten American babies are now born to native parents whereas a quarter century ago more than half of the children born in America had at least one foreign-born parent, according to a report issued by the Metropolitan Life Insurance Company.

Only 5% of the babies born in 1940 had both parents of foreign birth, the company statisticians report, while in 1915, the earliest year for which annual records are available, 41% of the births were to foreign-born parents.

Not quite half of the 1915 babies had both parents born in the United States whereas just prior to the war about four out of every five had such parents.

Throughout this period the number of new-borns who had one native-born and one foreign-born parent remained relatively small. The proportion of total births to such parents rose slowly from 12% in 1915 to a high of 15% in 1930, then fell again to 12% in 1940. These figures may be expected to fall still lower as the proportion of foreign-born in the population diminishes.

The chance that a small child would play with a child who has only one foreign-born parent is today much greater than that he will play with a child with both parents born outside the United States. Today only one out of every 20 children is born to two foreign parents whereas one in every eight has one native-born parent and one who was born in a foreign country.

Science News Letter, April 21, 1945

AERONAUTICS-METEOROLOGY

Weather Causes Many Civil Airplane Accidents

➤ A SURVEY of the causes and contributing factors to airplane accidents in which non-military planes were involved reveals that in 1943 weather was the primary cause of 131 accidents, a contributing cause in 313 accidents, and a factor in 446 accidents, declares Earl L. Smith, air safety investigator for the Civil Aeronautics Board.

Urging weather study upon private pilots, particularly those who fly infrequently and can devote only a minimum of time to instruction, Mr. Smith called attention to the CAB pilot's guide for interpretation of weather reports.

Briefly the types of weather which private pilots should avoid were outlined by Mr. Smith. Pilots should avoid flying in low-pressure areas, since in these areas unfavorable weather may be brewing. If they must fly in low-pressure areas they should be on their guard for unfavorable changes.

High winds play havoc with light planes, and pilots should be careful to check wind velocity. High head winds, which the plane must buck, mean slower flying and in most cases frequent stops to refuel. Gusty winds around an airport, coupled with high velocity winds, make landing a plane dangerous and the control of the plane on the ground difficult for even an experienced pilot.

Local thunderstorms are often severe, and the knowledge of whether a thunderstorm is of either frontal or air-mass type is important to safe flight planning. If you fly through a thunderstorm the wind knocks you around, lightning often blinds you, and sometimes hail threatens to smash your windshield.

Fog, rain or snow may be expected when temperature and dewpoint approximate each other. Private flyers should compare hourly sequence reports to determine the trend of the temperature and dewpoint before taking off. There is no equipment to defog a plane, and most private planes do not carry de-icing units. Fog, non-freezing rain, and snow are hazardous principally because they obscure obstructions around airports, and you can not land a plane with normal flight instruments unless you can see. Freezing rain forms ice on leading edges, wings, propeller blades and windshields, destroying their efficiency. Often ice will cover a windshield to such an extent that it is necessary to break the glass in order to land safely.

Science News Letter, April 21, 1945

CHEMISTRY

Weed-Killing Aids War

Weapon developed by chemist for use against crabgrass in his lawn serves also in attack on the enemy in Tokyo. Is deadly incendiary.

➤ BECAUSE he didn't like crabgrass on his front lawn, the professor of chemistry at Harvard University set fire to Tokyo.

The chemist, Dr. Louis F. Fieser, tried everything he knew of to destroy the crabgrass that made his front lawn look patched and moth-eaten. Like most home owners who are plagued with the weed, he invested in fancy lawnmowers and trick gadgets. They didn't work. So he got down and pulled the stuff out by hand until his knuckles were raw. He didn't keep that up very long. Thinking that fire might be the answer, Dr. Fieser took a plumber's blowtorch and went after it. That worked, but it also put a crimp in his back.

Next he tried kerosene, but without success. He tried gasoline and it burned off in a flash, leaving the crabgrass roots unharmed. Before he was ready to admit defeat, Dr. Fieser realized that if gasoline could be made to burn longer, say for several minutes, it might destroy the crabgrass.

Dr. Fieser went to work on the problem, and started research that has resulted in the development of a new white powder which transforms ordinary gasoline into a deadly incendiary compound that has gutted more than 17 square miles in the heart of Tokyo and destroyed much of Osaka and Nagoya.

Called U. S. Army Thickener by the Chemical Warfare Service, the powder mixed with gasoline produces a substance resembling orange gelatin which can be fired from flame throwers and used in incendiary bombs. Incendiaries made with USAT are so effective that

they have all but replaced thermit and magnesium incendiaries.

When clusters of 38 bombs containing sacks of the incendiary gel explode, flaming gobs of jellied gasoline are hurled as far as 75 feet, and they stick to whatever surface they happen to strike. The gel generates a temperature of 3,000 degrees and will keep on burning as long as 10 minutes. Each bomb holds enough of the jelly to make a flaming flapjack one-quarter inch thick and a yard in diameter.

The first practical application of the incendiary gel was the "Harvard Candle," developed by Dr. Fieser and associates. It was produced for the Chemical Warfare Service as a campfire lighter. Packed in a three-inch celluloid cylinder, the gasoline jelly will produce a hot flame for six minutes and will ignite wood that has been drenched with several days' rain.

The idea of using USAT in incendiary bombs followed in due course. The research work was expanded until three CWS laboratories, eight National Defense Research Committee laboratories, and pilot plants were at work perfecting the gel. Although USAT has been manufactured for two years without change in formula at eight full-scale plants, it is still very difficult to produce and handle. Extremely sensitive to moisture, the white powder is ruined if exposed to humid air for more than a minute. It must be made under extremely careful conditions and shipped in airtight drums.

Further studies were made of the way the incendiary gel flows. As a result of these experiments as to what makes the powder-gasoline mixture viscous and gummy, and how it works, several new uses for the incendiary material have been discovered, but details are not disclosed at the present time.

USAT is just one of three incendiary petroleum compounds developed by American science since Pearl Harbor. The most recent is a synthetic lava known as "goop", a rubbery mixture containing magnesium paste coated with particles of asphalt, gasoline and other ingredients. It surpasses natural volcanic lava in heat intensity and is used in 500-pound M76

block-burner bombs. "Goop", developed by the Chemical Warfare Service at Edgewood Arsenal, Md., produces a spectacular white-hot glow. It laughs at water; foam extinguishers cannot put it out, and it is virtually unquenchable.

Another incendiary material, known as "Compound X," was developed by the ammonia department of the E. I. du Pont de Nemours & Company. This ingredient had previously been used as a hair lacquer but, after modification, proved to be an effective gasoline-thickening agent. It is being used in six-pound tail-ejection bombs and in 100-pound oil bombs.

The advantage which USAT has over "goop" and Compound X is that it can be shipped in powdered form to the battlefronts and mixed with gasoline in the field. The other mixtures must be produced at arsenals and industrial plants with special equipment.

One day, after the development of the incendiary gel, Dr. Fieser decided to see whether it would work against the crabgrass pest on his front lawn. Using an old tomato can, he scattered the mixture on his lawn and touched a match to it. It blazed furiously for several minutes, and burned everything, including the doctor's prize bluegrass, to ashes. Would he never be able to destroy that crabgrass?

The answer came a few days later. Green blades of grass began to show above the blackened lawn. They grew from the roots of the prize bluegrass which were unharmed by the incendiary gel, and soon the lawn was as good as new.

Thus crabgrass, and the Mikado's men, fell victims to heat and flame produced by American scientific ingenuity.

Science News Letter, April 21, 1945

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

WYOMING

A Summer to remember

The 900-acre Paton Ranch will give you trout-fishing in a mountain stream in the foothills of the Big Horn mountains, daily horse-back rides along picturesque canyon trails and excellent food—most of which is grown on the ranch.

The region abounds in geological and historical interest—dinosaur bones, marine fossils and implements used by the Indians many years ago.

Write for illustrated, descriptive folder

PATON RANCH, SHELL, WYOMING

MATHEMATICS DICTIONARY

Invaluable in reading any book that uses mathematics.

The James Mathematics Dictionary

the only such book now published, provides standard definitions of the terms and phrases from arithmetic through elementary differential equations, the technical terms ordinarily used in the applications of these subjects, and more advanced basic terms. Easy examples, many illustrations and all sorts of formulas are included. The appendix contains tables of weights and measures, a list of mathematical symbols and tables ordinarily used in handbooks.

This dictionary is a great deal more than a collection of definitions. It explains, illustrates and correlates, stressing especially those operations that are hardest to understand. One reader has called it "Ten texts in one." Second printing of Revised Edition, just off the press. Blue fabric binding, for \$3.00, from the Digest Press, Van Nuys, California, or Science News Letter.



Frost and Flowers

➤ **APRIL SHOWERS** are traditionally given credit for bringing forth May flowers, but as a matter of fact the frosts of December, January and February deserve the greater share of the credit. For practically all of our temperate-zone spring-blossoming plants, whether trees and shrubs or perennial herbs, will not break their winter sleep until they have gone through a definite period of low temperature.

This arrangement works as a kind of lite insurance. Woody plants shed their leaves in autumn, and perennial herbs die down to ground level, without waiting for frost. The stimuli that cause them to become dormant are not primarily low-temperature responses. If the plants responded to the first warm rain that came along, they would be deceived into putting forth flowers and leaves by the Indian-summer weather that comes practically every autumn—and they would of course be caught and stripped when real cold weather began. However winter-land plants acquired this particular adaptation, it is certainly a good thing for them that they have it.

The biochemical mechanism involved is at least partly understood. Tree and shrub buds are stimulated to unfold, and underground bulbs, tubers and rootstocks to send up new shoots, by certain enzymes in their cells. These enzymes will not start the vital chemical reactions for which they are responsible unless they are first well chilled, then warmed.

The degree of chilling, and the length of time it must be continued, differ widely among plants. Some flowering shrubs have a very light dormancy: a few nights of frost suffice for their chilling requirements, and after that they are ready to break into bloom on the slightest provo-

cation. Thus we see forsythia, ornamental quince and several kinds of honeysuckle putting forth at least a few flowers during a warm autumn, and sometimes even in a mild winter.

On the other hand, some species require a really stiff freezing before their enzyme combination will unlock itself. Common examples are lilac, snowball, most fruit trees, most bulb flowers and a great many of the other perennial herbs. Lily-of-the-valley is an especially tough customer about wanting to have its toes well frozen before it will wake up.

This phenomenon, of course, is limited mainly to plants that grow in regions where there are fairly well-marked temperature differences between summer and winter. Many tropical and sub-tropical species do have dormant periods, but these are governed by factors other than winter cold. Winter drought, for example, is important in the dormancy of plants from monsoon regions. And many tropical plants, from regions where year-long growth is possible, never become dormant at all.

Science News Letter, April 21, 1945



Valentino Sarra made the above two photographs with two cameras with simultaneous and equal exposure

"Balcote" Revolutionizes Optical Science



To build lens systems that would let more light through . . . that would eliminate the light loss and the "flare" caused by internal reflections . . . that would give sharper, clearer, more brilliant images . . . has been the objective of scientists for years.

Long before the war, Bausch & Lomb had developed methods of coating lenses to reduce reflections and permit the passage of more light. As a result, Bausch & Lomb, in 1939, introduced B&L Super Cinephor Projection Lenses with antireflection coatings. These lenses were used in projecting the Technicolor motion picture, "Gone With The Wind." They passed 30% more light, made possible the richer, deeper colors on a larger screen.

A further improvement of this same coating, today known as *Balcote* and recognized as among the best and most permanent available, is used on B&L Photographic Lenses, other military optical instruments, and wherever light transmission is a problem. In wartime binoculars, the use of *Balcote* has meant an increase of as much as 54% in brilliance. Bausch & Lomb Optical Co., Rochester 2, N. Y.

BAUSCH & LOMB

ESTABLISHED 1853



Makers of Optical Glass and a Complete Line of Optical Instruments for Military Use, Education, Research, Industry, and Eyesight Correction and Conservation

Do You Know?

An *ostrich egg* may weigh four pounds.

Lithium is successfully used as a de-oxidizer for copper.

Yosemite Falls, in the park of that name, has a total fall of 2,425 feet.

Lactic acid is a normal constituent of sauerkraut and ensilage.

The *red deer* can clear a seven-foot fence, and a twenty-foot chasm.

P-aminomethylbenzenesulfonamide, or *sulfamylon*, one of the newest of the sulfa drugs, is claimed to be particularly effective in the treatment of gas gangrene.

Two collared *peccaries* in the Philadelphia zoo learned to close and open the door to their house in cold weather; peccaries are New World tropical wild pigs.

A full-grown *kangaroo rat* can carry a teaspoonful of seeds in each cheek pouch, and at this rate would have to make 600 trips with loaded "packs" to accumulate one bushel.

A rich *lead deposit* has been discovered and opened seven miles west of the great Picher field in northeast Oklahoma; it is 100 feet deeper than the ore in the Picher field.

The western *burrowing owl*, that nests in deserted prairie-dog or ground-squirrel burrows, often comes out in the daylight and stands bobbing its head and bowing comically before backing down to wait for darkness.

NEW "PICK-UP" CANE

Permits Disabled Persons To Pick Up Small Articles Without Painful Stooping.

NO OTHER CANE LIKE IT

The Mason "Pick-Up" is a light double purpose cane with concealed patented pick up mechanism that enables the user by simple finger pressure and without any stooping to easily pick up papers, pencils, cards, coins, etc. Proper balance and rubber grip tip insures safer walking. Use a beautifully finished Mason "Pick-Up" Cane yourself or as a perfect gift for a disabled service man or friend. Write today for FREE CIRCULAR and 5 DAYS TRIAL OFFER.

W. H. MASON Box 27, Leesburgh, Ohio



GEOLOGY-ENGINEERING

Oil Restoration

Rehabilitation of refineries in Europe and the Far East is biggest postwar problem facing oil concerns. Destruction in Rumania great.

See Front Cover

➤ THE BIGGEST problem facing large oil companies after the war is the rehabilitation of their properties in Europe and the Far East, Eugene Holman, president of the Standard Oil Company (New Jersey) told a group of newspaper women meeting in New York. The total amount of damage caused by the war is as yet unknown, he pointed out.

The refineries in Rumania, for instance, have been pretty well knocked out, he stated, while oil fields only 40 or 50 miles away suffered relatively little damage.

Those concerned about the future of the oil industry after the war, Mr. Holman said, follow two schools of thought—of plenty and of scarcity. Standard Oil believes that in the United States there will be plenty of oil for several decades to come.

If substitutes are relied upon, there will be enough gasoline for 2,000 to 4,000 years, he estimated. Studies are being made on synthetic fuels—gasoline can be made from any carbohydrate such as wood or potatoes—to produce them economically.

Since we in the United States have been expanding to take care of war requirements, we will end the war with thoroughly modern and renovated plants. We actually gained a little in the known crude-oil reserves during the war, our reserves being a little larger now than before Pearl Harbor because of the finding of new fields.

The picture of the catalytic cracker, one of many which make possible the greatly increased production of 100-octane gas, shown on the cover of this week's SCIENCE NEWS LETTER, is from the company's new photographic library.

Within five years after the war, one out of every five civilians who travel by plane will do so in jet-propelled airplanes, Robert Russell, president of Standard Oil Development Company, predicted. Further research will be needed, however, to discover what types of fuel are best suited to get the most out of these devices.

The quality of gas has gone down during the war about 15 octane numbers so that today it is approximately the same as that used by motorists 12 years ago, said Robert Haslam, director of the Standard Oil Company (New Jersey). Now everyone notices the poor quality of gasoline, since the best is going into aviation gas.

Science News Letter, April 21, 1945

PHYSICS

Cosmic Rays Are Relics Of Primitive Radiation

➤ COSMIC RAYS, those extremely penetrating rays which reach the earth from outer space, are merely what is left of high-frequency radiation started on its way when the universe first came into being, Prof. E. A. Milne of Oxford states. (*Nature*, Feb 24)

At the time of creation, Prof. Milne says, those tiny bundles of light energy called photons all had the same frequency. But throughout the centuries light "aged" and the wavelength steadily increased.

"The wavelength of a photon is proportional to the epoch at which it is observed, independent of the value of its mean free path," Prof. Milne concludes, and presents mathematical calculations to back up his statement.

A photon which left our galaxy ages ago may in due course encounter one of the receding galaxies and either be scattered or reflected, he points out. After traveling a fraction of the radius of the universe, it arrives back at our own galaxy. It is then either reflected outwards again or travels through our galaxy unimpeded. In either case its frequency is not changed. It moves out again into intergalactic space, there to be eventually reflected back to us again.

The red-shifts in the spectra of galaxies, usually interpreted as showing that a galaxy is moving away from us, and the "aging" of light with the passing of eons by which the wavelength of a photon steadily increases, are substantially the same, Prof. Milne says.

Science News Letter, April 21, 1945

who was

WHO WAS the bus rider who pushed the total number of passengers carried by America's buses since Pearl Harbor over the twenty-eight-billion mark?

Was it a war worker on the way to make guns, tanks or airplanes? A serviceman headed homeward on his last furlough before shipping out? A nurse going on duty at a hospital?

It might have been any of these—or any one of millions of other Americans who rely on buses for transportation, day and night, rain or shine. The bus industry is to be congratulated on its record in this

war. Despite the limitations on skilled manpower, spare parts and new equipment, it is today carrying more than double the number of passengers it did in 1940 . . . and the country owes a debt of gratitude to the men of the bus industry for the job they have done.

The war has brought home how important a part gasoline plays in the transportation system of this nation. We, of Ethyl, are glad to have been able to contribute to the improvement of engines and fuels and look forward to continuing co-operation with both manufacturers and operators in the future.

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NUTRITION

National Nutrition Clinic

➤ MANAGERS of industries in Birmingham, Ala., who have seen how the Nutrition Clinic at Hillman Hospital there has aided war production through rehabilitation of workers, hope that in the postwar period it will become a national clinic. Thomas Martin, president of the Alabama Power Company and chairman of the Southern Research Institute, declared at the meeting of the Spies Committee for Clinical Research, held in New York.

The Nutrition Clinic is maintained by the University of Cincinnati. Dr. Tom D. Spies, associate professor of medicine at the University and director and founder of the clinic, reported that 800 persons had been rehabilitated at the clinic solely by means of dietary vitamin and mineral treatment. Each had been so weakened by diet deficiency as to be unable to work for a long period.

"We are hoping for the rehabilitation of the individual and it is accomplished, not through treatment alone, but through education," Mr. Martin said.

"To accomplish this, research and education must overlap and intermingle as Dr. Spies has several times pointed out. We are here tonight in pursuance of that point of view.

"During the past year, over 2,000 physicians, nurses, chemists and nutritionists visited the clinic at Birmingham; and thus the educational functions of the clinic have served a wide purpose, much beyond that having to do with a single area.

"This may be called applied research in the sense that those in charge, under the able direction of Dr. Spies, present the clinical results to others; and better than any other group, they are in position to collaborate with scientists of other institutions, teaching physicians, nurses and nutritionists who cannot acquire from textbooks sufficient skill and judgment to apply the best therapeutic methods; and by so doing to cut down on the lag period between the time the discovery is made and its application to human nutrition.

"This in part is learned from the patients and partly from illustrated lectures to students, medical scientists and other scientific bodies; finally, in the words of Dr. Spies, those in charge of the research are in position to 'search for unusual and original persons who will be the nutrition stars of tomorrow.'

"And I can assure you on behalf of my friends in industry, and indeed the public generally in the Birmingham district, that we welcome the suggestion that the work of Dr. Spies be expanded in the postwar period, so that it will in truth and in fact, be a national clinic."

Science News Letter, April 21, 1945

The thyroid to some degree affects the action of all other endocrine glands.

● Just Off the Press ●

AIDS TO BOTANY—H. J. Bonham—*Baillière, Tindall and Cox*, 215 p., illus., \$1.75, 2nd ed.

BRASSEY'S NAVAL ANNUAL, 1944—H. G. Thursfield, ed.—*Macmillan*, 303 p., illus., \$5.

CONSCIENCE AND SOCIETY, a Study of the Psychological Prerequisites of Law and Order—Ranyard West—*Emerson Books*, 261 p., \$3.

DOCTORS AT WAR—Morris Fishbein, ed.—*Dutton*, 418 p., illus., \$5.

THE EXCAVATION OF LOS MUERTOS AND NEIGHBORING RUINS IN THE SALT RIVER VALLEY, SOUTHERN ARIZONA—Emil W. Haury—*Peabody Museum*, 223 p., paper, illus., \$4.50

EXPERIMENTAL STUDIES ON THE NATURE OF SPECIES, II. PLANT EVOLUTION THROUGH AMPHIPOIDY AND AUTOPOIDY, WITH EXAMPLES FROM THE MADIINAE—Jens Clausen and others—*Carnegie Inst.*, 174 p., paper, illus., \$1.25.

FLAVOR—E. C. Crocker—*McGraw*, 172 p., illus., \$2.50.

JANE'S ALL THE WORLD'S AIRCRAFT, 1943-44—Leonard Bridgman, ed.—*Macmillan*, illus., \$19.

MASS RADIOGRAPHY OF THE CHEST—Herman E. Hilleboe and Russell H. Morgan—*Year Bk. Pubs., Inc.*, 288 p., illus., \$3.50

PHOTOGRAPHIC ENLARGING—Franklin I. Jordan—*Am. Photographic Pub.*, 252 p., illus., \$3.50, 3rd ed.

PRINCIPIO TO WHEELING, 1715-1945, a Pageant of Iron and Steel—Earl Chapin May—*Harper*, 335 p., illus., \$3.

PRINCIPLES OF PHYSICAL GEOLOGY—Arthur Holmes—*Ronald*, 532 p., illus., \$4.

THE RECONSTRUCTION OF WORLD AGRICULTURE—Karl Brandt—*Norton*, 416 p., illus., \$4.

SOME USEFUL TREES OF THE UNITED STATES—U. S. Forest Service, paper, illus., free upon request to The Forest Service, U. S. Dept. of Agric., Washington, D. C. A special compilation for members of Science Clubs of America.

THE TECHNIQUE OF BANDAGING AND SPLINTING, Including Sections on Slings and Adhesive Plaster Strappings—Arthur M. Tunick—*Essential Bks.*, 206 p., illus., \$3.

Science News Letter, April 21, 1945

• New Machines and Gadgets •

❁ **DOUGHNUT CUTTER**, cushioned to ease the effort of cutting, has a rubber padding between its domed top and its base-part which contains two circular cutting blades. The innermost blade, that cuts the hole in the doughnut, is attached directly to the domed top.

Science News Letter, April 21, 1945

❁ **DISPENSING BOTTLE** delivers a measured drink through a side-neck at the top. An inside cup-like partition near the top is the measuring device and is filled through an opening opposite the neck when the bottle is laid on its side. When tilted to pour, the cupful only is released.

Science News Letter, April 21, 1945

❁ **CORRUGATED ROOFING**, with corrugations or grooves running at a 10-degree angle with the long side of the metal strips, has overlapping joints less liable to leakage than the common design with grooves running lengthwise. The diagonal grooving directs the rainwater away from the joints.

Science News Letter, April 21, 1945

❁ **ACID HOOD**, that covers the head, shoulders, arms, chest and back of the wearer, protects laboratory workers against practically all acids. A clear window, shown in the picture, provides normal vision as well as protection. An air-feed unit and side vents give good air



circulation. Hood and window are made of a new plastic.

Science News Letter, April 21, 1945

❁ **OFFICE TELEPHONE**, mounted on the end of a long arm attached to the top of a supporting stand, swings to any one of the neighboring desks when a button on the desk is pushed. As soon as the receiver is hung up, the phone returns to its neutral position. A

tiny electric motor and proper wiring do the trick.

Science News Letter, April 21, 1945

❁ **INSULATION** cutter, to strip electric cable covered with a woven-wire and rubber combination, is a plier-like tool with a crosswise holding groove in a fixed jaw, and an adjustable cutting edge in the other. A thumbscrew adjusts the depth of cut, and the cutting edge can be turned to cut lengthwise or crosswise.

Science News Letter, April 21, 1945

❁ **OIL STRAINER** with large strainage area, for use on machine tools and other installations using flood oiling, is made of a unique combination of wire and cotton, interknitted into a mesh. No strainer housing is required. It is installed in the tank and the oil is piped direct from strainer to pump.

Science News Letter, April 21, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 255.

Question Box

BIOCHEMISTRY

To whom was awarded the first \$5,000 Pasano Award? p. 242.

What chemical has been found to be another naturally occurring antibiotic? p. 248.

CHEMISTRY

How did a scientist's battle with weeds in his lawn lead to development of a new Army weapon? p. 250.

How is common salt used in making ethyl chloride? p. 247.

Who developed a match that will light after it is soaked 8 hours in water? p. 245.

ENGINEERING

How are the shape and size of cams now determined? p. 248.

GENERAL SCIENCE

What development of wartime is it essential to preserve during peace? p. 246.

MEDICINE

Does the paralysis of brain hemorrhage have anything to do with the paralysis of polio? p. 242.

How is the virus of horse "sleeping sickness" spread? p. 244.

Where has the eye bank been established? p. 247.

MILITARY SCIENCE

How can mines be set off by radio? p. 243

PHYSICS

How can the frequency of quartz crystals be regulated? p. 242.

POPULATION

What proportion of U. S. infants are now born to foreign born parents? p. 249.

PSYCHOLOGY

What is the "best" combat officer like? p. 248.

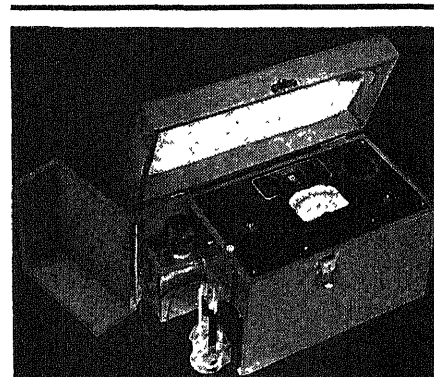
PUBLIC HEALTH

What signs are there of another season of high polio rate? p. 248

WILDLIFE

How does the bobcat aid farmers? p. 248.

Where published sources are used they are cited.



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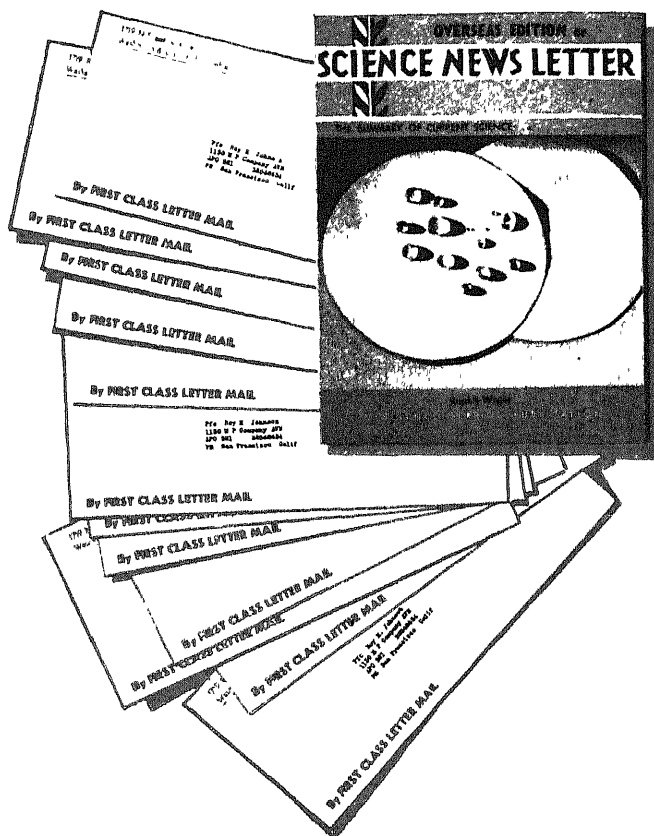
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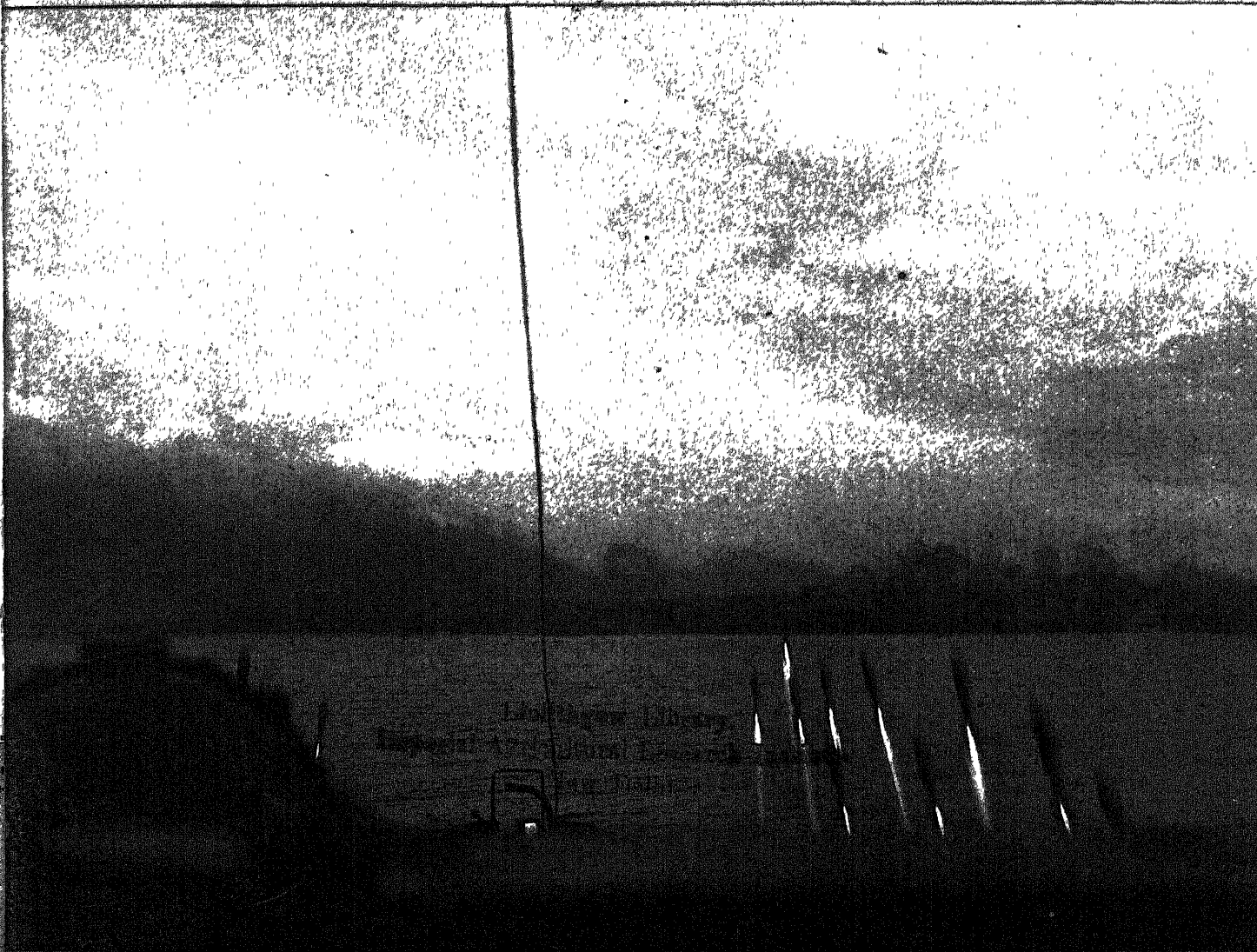


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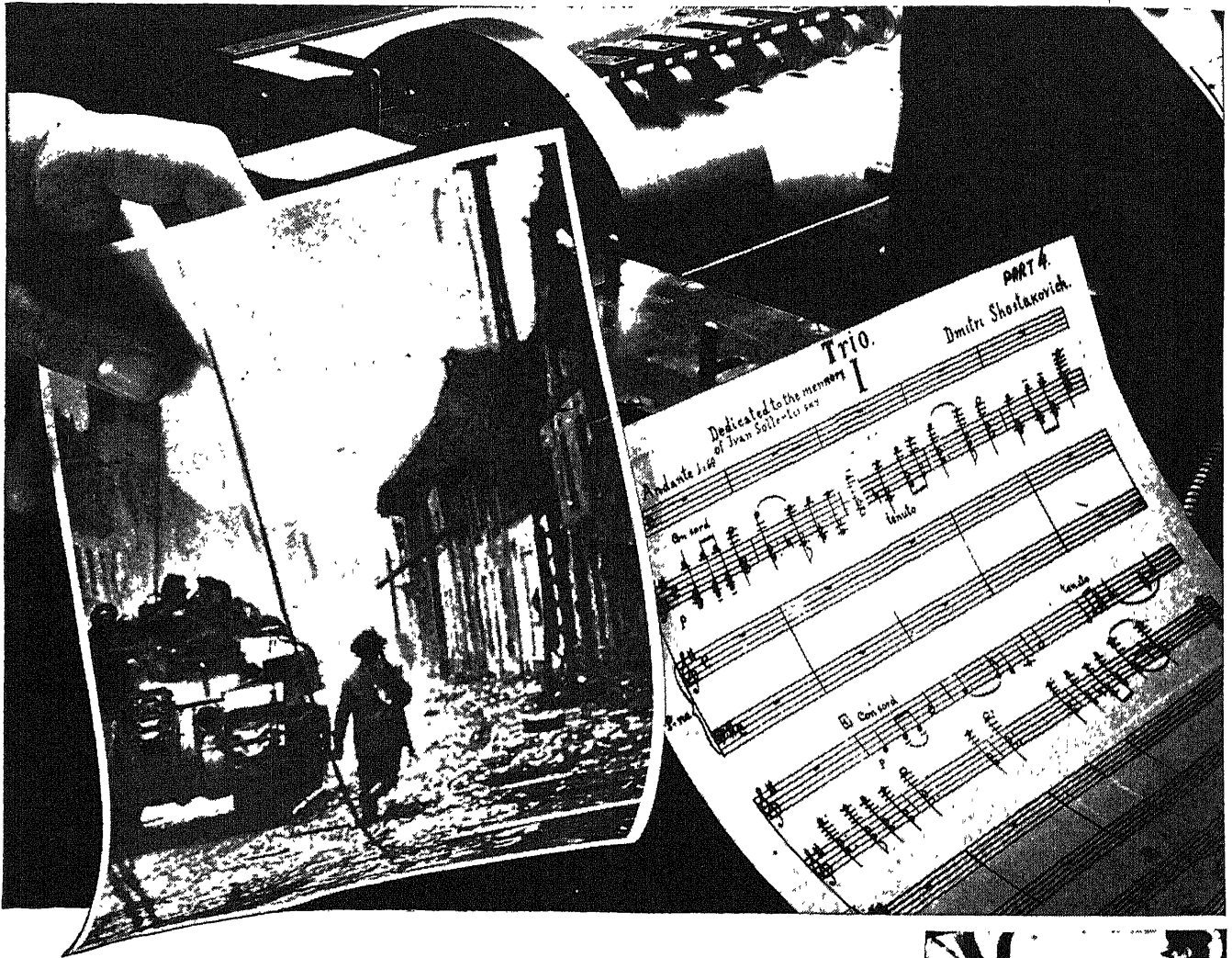
THE WEEKLY SUMMARY OF CURRENT SCIENCE • APRIL 28, 1945



Rockets for Palawan

Page 264

A SCIENCE SERVICE PUBLICATION



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PIONEERS IN PROGRESS



ASTRONOMY

"Young" Galaxies

Watch-shaped groups of stars, with long spiral arms may eventually develop into compact globular clusters of suns, Dr. Harlow Shapley states.

► WATCH-SHAPED groups of myriads of stars, with long spiral arms like those of a fiery pin-wheel, may be "young" galaxies that will eventually develop into compact globular clusters of suns, Dr. Harlow Shapley, director of the Harvard College Observatory, stated upon receiving the Franklin medal, the highest award of the Franklin Institute.

"The suggested direction of evolution is the reverse of that proposed by Sir James Jeans many years ago, who assumed that the spheroidal galaxies, through rotation, become flattened and develop spiral arms," Dr. Shapley said in presenting his alternative tentative hypothesis as to how galaxies evolve.

Spiral galaxies, like our own Milky Way system, contain many clouds of stars and star-dust, Dr. Shapley explained. Differential rotation within such galaxies would gradually tend to eliminate these clusters and clouds. Thus, as they develop, the spiral galaxies should become free of such non-uniformities and take on the smooth structure characteristic of the spheroidal galaxy.

Like our own Milky Way, the wheel-shaped galaxy contains many supergiant stars. Stars which cluster together in elliptical and spherical systems, on the other hand, are almost never supergiants. Since it is at present believed that the life of a supergiant star is relatively short, the existence of supergiants would indicate that the spirals are less developed, Dr. Shapley said, unless such supergiant stars are still being born.

"New studies made with the South African reflector of the Harvard Observatory," the Director stated, "suggest that there are truly transitional types between the open and the compact star clusters—a phenomenon that had not been evident from the studies of the globular clusters of our own galaxy."

Our own Milky Way is about 100,000 light years in thickness, Dr. Shapley pointed out. Remeasurement of the distances of about 30 of the 100 globular clusters of our galaxy established the thickness of the haze of stars and clusters that surrounds the flattened watch-shaped main body of the galactic system.

Giant globular clusters are about as bright and of the same general structure as the nuclei of some of the spiral galaxies. From comparisons of the greatest of globular clusters and the smallest of the spheroidal galaxies, we believe that clusters like the southern hemisphere groups of stars, Omega Centauri and 47 Tucanae, Dr. Shapley said, are organically related to such galaxies as the companions of the great Andromeda Nebula, our nearest neighbor.

The study of globular star clusters has made four major contributions to the study of the sidereal universe, Dr. Shapley pointed out:

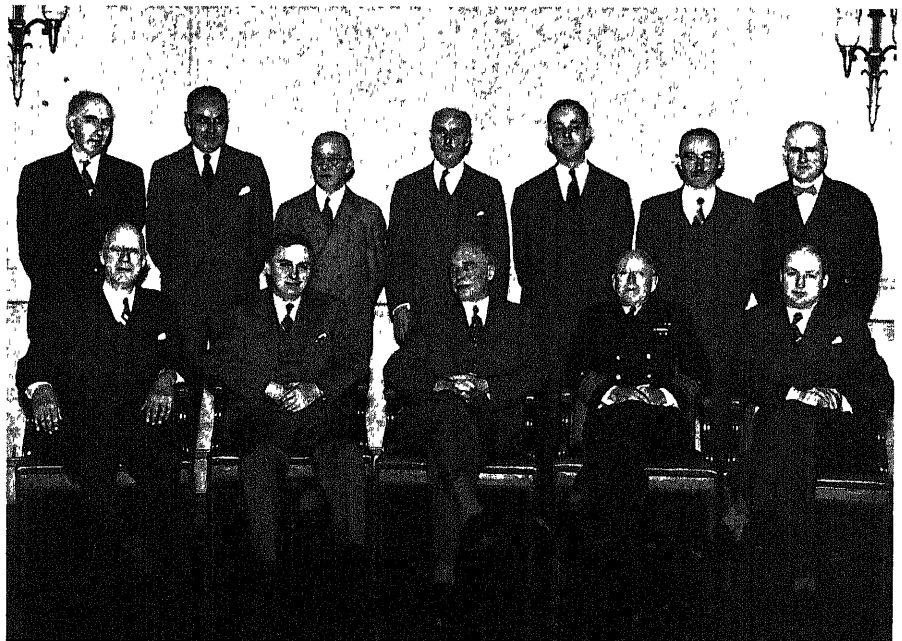
"The first developed rapidly at the Harvard Observatory about fifty years ago when Professor S. I. Bailey began his extensive work in the discovery and study of variable stars in the brighter globular

clusters. Eventually a dozen workers entered the field. The 'cluster-type Cepheids' were linked up with the regular or classical Cepheids into the period-luminosity relation, which has provided us the yardstick for measuring our galaxy and others.

"The second somewhat revolutionary discovery concerns the candle-powers and colors of stars in globular star clusters. The distribution of the cluster stars among the various candle-powers and spectral classes (colors) was found to be distinctly different from that of stars that surround the sun. Later this globular cluster distribution was found to be characteristic of the nucleus of our galaxy and the nuclei of other spiral galaxies like the Andromeda Nebula; and similar also to the distribution in the great spheroidal galaxies.

"Through their non-symmetrical distribution in the sky, globular clusters gave us our first clear indication that the center of our galaxy is very distant in the direction of Sagittarius.

"The high radial velocities, frequently more than a hundred miles a second, have shown that the clusters, perhaps like high-latitude Cepheid variables, have a peculiar part in the structure of the



FRANKLIN INSTITUTE MEDAL DAY DINNER—Back row, left to right: Dr. Rupen Eksergian, Levy Medal; Dean Gilmore D. Clarke, Brown Medal; Sanford L. Cluett, Longstreth Medal; Dr. Henry B. Allen, Secretary and Director, Franklin Institute; Greer Ellis, Certificate of Merit; Walter J. Coppock, Certificate of Merit; Dr. Zay Jeffries, Clamer Medal. Front row: Prof. Lewis F. Moody, Cresson Medal; Dr. Harlow Shapley, Franklin Medal; Charles S. Redding, President, Franklin Institute; Rear Adm. Stanford Hooper, Cresson Medal; Edwin A. Link, Potts Medal.

galaxy, unlike that of neighboring stars or the stars of the Milky Way."

Other medals awarded were the Cresson Medal, the Potts Medal, the Levy

medal, the Clamer Medal, the Brown Medal and the Longstreth Medal. (See SNL, March 31.)

Science News Letter, April 28, 1945

setts and Spring Hill College near Mobile, Ala., and of the U. S. Coast and Geodetic Survey at Ukiah, Calif., and Tucson, Ariz.

Science News Letter, April 28, 1945

Grass will grow on rocky road shoulders if from 5% to 10% of clay soil and some fertilizer are added.

The deepest oil well drilled up to the present time is a 16,246 foot hole at Taft, Calif., in which some oil was found at the 11,000 foot depth but none below; it took 17 months to drill the well.

PSYCHOLOGY-SAFETY

Disabled Have Accidents

Excessive number of accidents occur among workers with certain types of impairments, especially hearing defects. Efficiency equal to able-bodied.

► WORKERS with physical disabilities have more accidents than able-bodied workers, although the two groups are about equal in production and efficiency, Dr. Verne K. Harvey and Dr. E. Parker Luongo, medical director and assistant medical director of the U. S. Civil Service Commission, report, (*Journal, American Medical Association*, April 14).

Their findings are based on a study made in preparation for the responsibilities the Commission will have in placement of disabled veterans.

The job performance of 2,858 physically impaired workers and of 5,523 able-bodied workers, both male and female, of similar age, experience and occupational characteristics was compared. The workers were employed in 43 establishments of the War and Navy Departments in various parts of the country.

An excessive number of accidents occurred among workers with certain types of physical disabilities. Workers with hearing defects had accidents at the most frequent rate and at the highest severity rate of all impaired workers.

The other types of impairment which accounted for an excessive number of accidents were deformities of shoulder and hip, amputation of fingers and visual defects.

A psychologic factor plays an important part in accident proneness. This is true of both able-bodied and physically impaired workers. It is more significant, however, among workers with certain types of physical defects.

Fatigue may be important in this connection. The study showed that physically impaired workers given to frequent accidents also had frequent short absences for illness. Those who most often report minor illness may get tired more easily and be more likely to have accidents. Workers with arrested tuberculosis had the highest average number of days lost because of sickness but the lowest rate for frequency of accidents. This may be because a large number of them take

sick leave as a precautionary measure, having been taught while under treatment for tuberculosis to avoid fatigue.

Among significant findings of the study was the fact that less than one-tenth of the impaired workers were given special considerations with regard to transportation, lunch and rest periods, hours of work, methods of remuneration, special equipment or reporting time.

"The commission will continue," the report concludes, "to stress the need for, and within the limits of its authority, aid in the development of adequate health and safety programs for federal employees, so that disabled veterans and other impaired workers will be judiciously placed in positions where they may function proficiently and safely."

Science News Letter, April 28, 1945

SEISMOLOGY

Two Earthquakes Recorded Weekend of April 14-15

► TWO EARTHQUAKES shook the earth's crust at widely separated spots under the ocean bottom, during the weekend of April 14-15, seismologists of the U. S. Coast and Geodetic Survey determined, from data transmitted telegraphically through Science Service.

The first epicenter was off the coast of Kamchatka, in the region of latitude 55 degrees north, longitude 161 degrees east. It was a strong shock, originating at 10:35 1 p.m., EWT, on Saturday.

The second quake, which was of only moderate intensity, had its epicenter off the west coast of Mexico, below the mouth of the Gulf of California, in approximately latitude 23 degrees north, longitude 108 degrees west. Time of origin was 3:50.5 p.m., EWT, on Sunday.

Observatories reporting were those of the Jesuit Seismological Association at St. Louis University, Georgetown University, Weston College in Massachu-

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PSYCHOLOGY

Monkeys Use Concept

That animals can be taught to sort objects in a complex way may make possible new research of effects of brain injuries such as suffered by soldiers.

➤ A MONKEY trained to sort out objects by color in a complex way may open the way for new research on the functioning of various parts of the brain and on the effects of brain injuries such as those suffered by soldiers in the war.

This is the monkey's problem: To look at an assortment of red and blue objects—little flower pots, glass ash trays, skeins of wool, feathers, cups, thimbles and blocks—and to sort out all the blue objects when he is given a cue in the form of an uncolored ellipse-shaped block, or all the red objects when he is shown an uncolored triangular block.

You can do this, because you have a human brain, not a monkey's. Or, at least, you can do it provided you have not had certain kinds of brain injuries. It has not been supposed before that monkeys could be taught to do it.

This experiment in training a Rhesus monkey to use such an abstract concept as color and to respond to a symbol in much the same way as is done in some human intelligence tests, was conducted by Dr. Benjamin Weinstein in the University of Wisconsin's Primate Labora-

tory. Dr. Weinstein hopes that the accomplishment may make it possible to use monkeys in research that will throw new light on the effect of brain injuries that sometimes damage this ability in symbolic thinking.

Preliminary experiments make him think that it may some day be possible to teach the monkey, Corry, to respond to the spoken words "red" or "blue" instead of the triangle or ellipse.

Corry's achievement did not come overnight. It is the result of a long course of instruction in which he was first taught to match two objects similar in both color and form. Later he learned to pick all the objects of the same color as the one he was matching, regardless of variations in size and shape. He learned to pick all objects of one color even when they differed in brightness and saturation. Finally, in the last step of the instruction, he learned to pick out all the blue or all the red objects when the object that served as a signal to him was not itself colored.

Details are reported in *Genetic Psychology Monographs*.

Science News Letter, April 28, 1945

GEOLOGY

Oil from Borneo

➤ OIL from the wells of Borneo may soon fuel American planes and warships in the Chinese seas and the Philippine area, if MacArthur continues his progress from the Sulu islands into Borneo, to which this archipelago leads. Since the occupation of Borneo, Java and Sumatra by the Japs, these three islands have furnished Japan with most of its fighting fuel, the Borneo production being the most important. The tanker line to Japan has already been cut; now it is necessary to capture the wells.

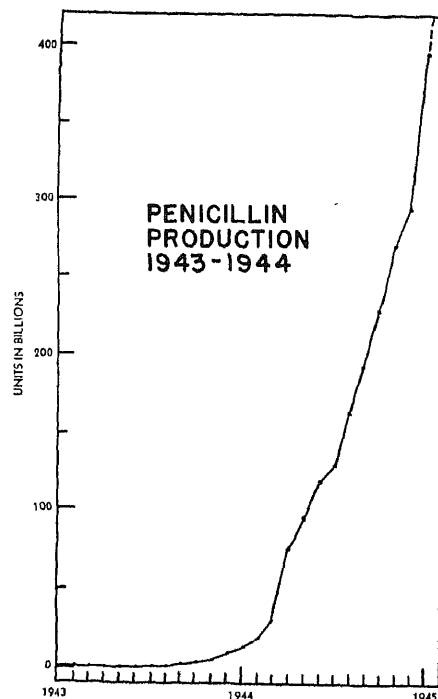
Borneo is the second largest island in the world, not counting Australia and Greenland. New Guinea is about 10% larger. Borneo is nearly as large as Texas and Louisiana together, with an area of approximately 300,000 square miles. North Borneo and Sarawak together constitute British North Borneo, two in-

dependent states. They contain about 82,000 square miles of territory and had a prewar population of approximately 800,000 persons, of whom less than a thousand were Europeans.

The rest of Borneo is a part of the Netherlands East Indies; its prewar population was over 2,000,000. North Borneo occupies the northern tip of the island and is the area adjacent to the Sulu archipelago. Sarawak occupies the entire northwest coast bordering on the South China sea.

Both parts of Borneo produce oil. British North Borneo produced nearly 777,000 tons of petroleum in 1939, and the Netherlands Borneo over 8,000,000 tons in 1938—figures for 1939 not being available.

Many other products of Borneo were essential items to Japan, although not as



PENICILLIN CURVE—Why your doctor can prescribe penicillin today whereas he could not, in most cases, a year ago is shown in this spectacular penicillin production curve prepared from War Production Board figures by the editor of the *Practical Pharmacy Edition of the Journal of the American Pharmaceutical Association*. The 1945 production will be triple or quadruple that of 1944, Fred J. Stock, chief of the drugs and cosmetics branch of WPB's chemical bureau, predicts in a report to the pharmaceutical journal.

essential to the Allies at the present time as the oil. The British area produced coal, copper, manganese, gold, iron and tin. Its principal non-metallic product was rubber. The Netherlands Borneo produced asphalt for paving, bauxite for aluminum, industrial and gem diamonds, manganese, phosphate rock for fertilizer and other uses, sulfur, silver and tin. For foods it raised much rice, and also sugar, coffee, tea and coconut products.

The island of Borneo is generally mountainous, without any very high elevations and few distinctive mountain ranges. Its climate is hot and damp, and it has a rainfall of about 150 inches a year. Improved highways are not plentiful. It has some fairly good ports.

Science News Letter, April 28, 1945

Shoulder blades of *bison* were used for hoes by some American Indians.

MEDICINE

Artery Disease Research

President Roosevelt's death may focus attention on the need for study of this major cause of death as in life he called attention to polio needs.

➤ IN LIFE President Roosevelt more than any other person focussed the nation's attention on the need for funds to fight infantile paralysis.

Perhaps his death will focus attention on the big medical problem of heart and blood vessel disease. Cerebral hemorrhage, from which he died, is part of this big problem. The strain that causes hemorrhage from blood vessels in the brain in one man may fatally damage the blood vessels of the heart in another.

Diseases of the heart, arteries and kidneys cause the majority of the adult deaths in the United States, Dr. Henry S. Simms, of Columbia University College of Physicians and Surgeons, told the Senate Subcommittee on Wartime Health and Education at a hearing last December.

The number of these deaths is increasing yearly and is far in excess of war casualties, he stated.

Although heart and artery diseases killed 536,745 persons in the United States in 1940, only \$93,835 was spent that year on research on these diseases. That is at the rate of 17 cents a death.

By contrast, \$2.18 research money was spent for each of the 164,906 cancer deaths, \$4 for each death for infectious disease other than infantile paralysis, and \$525 for each of the 1,026 infantile paralysis deaths that year.

A concerted program for an all-out fight on diseases of the heart and blood vessels, comparable to the programs for fighting cancer, tuberculosis and infantile paralysis, has not yet got under way. Individual scientists or groups of them are working on various parts of the problem, such as diabetes, gout, kidney disease, high blood pressure and emotional and mental strains, all of which may affect the health of the blood vessels and heart.

From one of these groups of researchers, Drs. R. D. Taylor and Irvine H. Page, of the Lilly Laboratory for Clinical Research at Indianapolis, has recently come a yardstick for predicting death from apoplexy in persons with high blood pressure.

Grim foreboding though this may be

to some, establishment of the yardstick, if confirmed by further studies, may open the way to a more direct search for methods of preventing death from cerebral hemorrhage. It will, moreover, offer comfort and assurance to those who probably will not die of apoplexy, even though they have high blood pressures.

The yardstick applies only to persons with high blood pressure of the type doctors call essential hypertension. It consists of five signs: severe headache at the back of the head or the nape or scruff of the neck; vertigo (dizziness) or fainting spells; motor or sensory neurologic disturbances such as memory defects, loss of ability to speak, and numbness or tingling; nosebleeds; and retinal hemorrhages without papilledema or exudates which the physician can determine from examining the eyes.

Apoplexy may strike, suddenly and fatally, in a person otherwise in apparently good health. If, however, any four of the above five signs appear in a person with essential hypertension, Drs. Taylor and Page state from their findings, it may be assumed that the patient will die of apoplexy within eight-tenths of a year to five years or, on the average, within 2.1 years.

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CARTOGRAPHY

Spherical Maps Save Space, Can Be Turned Quickly

➤ A GLOBE which can quickly and easily be turned with the finger tips to any desired position, and a nesting series of concave and convex spherical maps, arranged on frames which swing about a central axis, are increasing the usefulness of maps presented on a curved surface.

A new type of mount, which makes it easy to swing the globe about any one of three axes, eliminates the large amount of space needed for a globe set in the middle of the floor, and makes it possible to have built-in globes in classrooms, board rooms and offices.

A five-foot globe weighing several hundred pounds may now readily be turned to any desired position with little

effort by means of the mechanical mount developed at the Science Museum of St. Paul, Minn. And polar areas, which were inadequately represented in the traditional axis and ring globes, may be carefully studied by those interested in air routes.

An atlas of spherical maps, some convex and some concave, arranged on frames which swing about a central axis, has made it possible to display a series of spherical maps without occupying too much space. The maps fit into each other and both the inside and outside of the sphere are used.

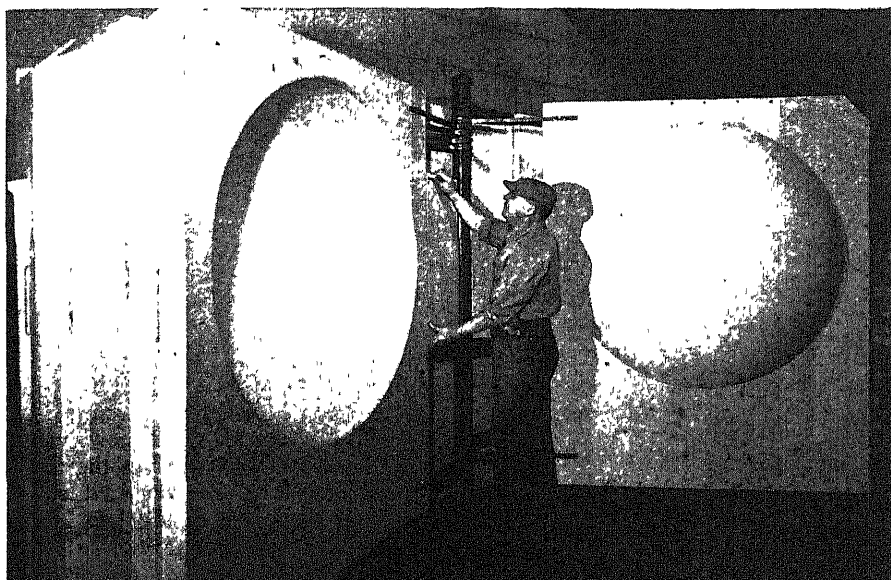
From the observer's standpoint, the chief advantage of concave maps is that he is looking at the inside of the bowl, and the map swings about him instead of curving away from his line of sight, states Dr. Louis H. Powell, director of the Science Museum.

"In its pioneering map exhibits dealing with national security, the first of which appeared in April, 1941," reports Dr. Powell, "the Science Museum abandoned at the start all attempts to represent the earth on flat planes and has used exclusively globes, segments of globes and concave spherical maps."

As long as one cannot see the entire surface of a globe at one time, a spherical segment of the globe is just as useful for most purposes as the globe itself. Most



EASILY TURNED—Large globes weighing several hundred pounds may readily be turned to any desired position. A recessed globe which can easily be oriented about any one of three axes is shown being used by a schoolboy.



SPHERICAL MAPS—A nesting series of concave and convex maps, arranged on frames which swing about a central axis, is being completed. Such an atlas of spherical maps will be used by the Science Museum in St. Paul to show the course of the war.

of the Museum's map displays have used large circular segments of globes, which in their entirety would be over 10 feet in diameter. Most globes lose part of their usefulness by being too small.

Since large globes will not go through the average doorway, the globes are cast in separable hemispheres. The Science Museum has successfully evolved a method of casting hemispheres and globe segments in basin molds prepared on a plaster-of-Paris master form.

The globes and spherical maps are made of a papier-mache composed of small squares of brown paper dipped in a dextrin-tempered plaster mix. The smooth surface is obtained during cast-

ing by brushing in a thin layer of the soft casting medium before laying the paper. The maps are reasonably durable and the material not particularly affected by atmospheric changes.

Due to these developments, the use of large globes is becoming increasingly practical. The Navy ordered 40-inch black-board-surfaced globes for training aerial navigators. And the blackboard-surfaced globes with and without the mechanical mounting are already being used in schools, colleges and by airlines so that people can trace their real or imaginary trips on a globe which truly represents the curvature of the earth.

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ENGINEERING

Engineering Guidance

➤ AFTER seeing the miracle which has been performed by American industry during this war, South American young men are turning to the United States rather than Europe for engineering educations, Anibal Santos, formerly mechanical engineer of Empresa Electrica del Ecuador, Inc., Guayaquil, Ecuador, and now associated with the Combustion Engineering Company, reported at the meeting of the American Society of Mechanical Engineers. Only recently have South Americans begun to study engineering in North America, he pointed out.

The problems faced by American engineers in Latin America are complicated by the fact that there are relatively few technical men there, as compared with the legal and medical professions, Mr. Santos stated. It was not until recent years that South America began to think of industry and manufacturing, and therefore until recently there was little interest in the engineering profession.

Praising the Good Neighbor Policy, Mr. Santos declared that there is still much more to be accomplished. Closer intermingling with local people and fa-

miliarity with the languages of the country will be helpful in better understanding, he predicted.

Winning Good Will

➤ ACCEPTING speaking engagements to tell Brazilians about life in America, familiarity with Brazilian labor laws, import regulations, knowledge of the country's trade journals, a willingness to give technical help, were among the means suggested to the meeting by Chandra R. Saksena, of Rio de Janeiro, to win the good will of Brazil and its people.

Addressing his remarks to Americans who expect to engage in industrial and business enterprises in Latin America, he pointed out a number of do's and don'ts to observe while in Brazil. We must remember, he stated, that Brazil is a new and rapidly developing country. It lacks the complex organization of the United States and other older nations. Brazil's Latin cultural background naturally presents a pattern of different habits and customs.

He also suggested that Americans refrain from meddling in politics or religion. "We have a good motto which we tell all our foreign friends as they arrive," he stated: "If you want to keep out of trouble, keep out of politics."

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MEDICINE

Anti-Germ Activity Found In Buttercup Juice

➤ THE POSSIBILITY of a remedy like penicillin being developed from buttercup juice appears in a report by Dr. Beatrice Carrier Seegal and Dr. Margaret Holden, of Columbia University College of Physicians and Surgeons in *Science*, (April 20.)

Growth of streptococci, staphylococci, pneumonia, anthrax and tuberculosis germs and a number of other microorganisms that cause sickness in humans was stopped by juice pressed from buttercup leaves, stems and blossoms. A steam distillate of this pressed juice was also effective. Anemone juice gave similar results.

The use of the buttercup juice as a remedy in infections was prevented by its toxicity for laboratory animals. The distilled juice is less poisonous than the whole juice. Chemical methods are now being developed, the scientists report, in an effort to separate the poisonous from the anti-germ substances.

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MILITARY SCIENCE

Rockets Add Their Force To Palawan Bombardment

See Front Cover

➤ **ROCKETS STREAK** out from a vessel of the Seventh Fleet, as shown in the official U. S. Navy photograph on the front cover of this SCIENCE NEWS LETTER, to add their force to the bombardment which blanketed the shore near Puerto Princesa in smoke.

The action took place on Feb. 28 when troops of the Army's 41st Division were landed on Palawan by the Seventh Fleet in another of the series of sure and well-timed strokes which has marked the Philippine campaign.

Science News Letter, April 28, 1945

ETHNOLOGY

Werewolves on the Loose In Germany, Nazis Say

➤ **THE WEREWOLF** is on the loose again in Germany, according to Nazi propaganda, to raise a reign of terror in the Fatherland for Germans who accept office in conquered territory under control of the Allies, and for Allied soldiers caught off guard within the Reich. The werewolf of medieval days was only a superstitious belief; the present werewolves are members of an underground party, and are real, the Nazis say, and they will strike with suddenness and without warning.

The werewolf of medieval days, also called the werwolf or the wehrwolf, was a person who, according to the superstitions of the time, was able at will to assume the body of a wolf, retaining, in part at least, the human mind, but taking on the beast's cunning, strength, savagery, and desire for human flesh. He assumed the form of the beast usually at night, and then preyed on wanderers in lonely places to satisfy his cannibalistic taste for human flesh.

Belief in werewolves was common in much of Europe. The were-jaguar was a similar superstition among the Indians of the Amazon basin. Other peoples believed in the were-bear, were-tiger and were-hyena.

The word werewolf means literally man-wolf. In Norse it was *vargulf*, meaning a wolf worse than any other kind of wolf. Perhaps this is the name the Nazi underground should have adopted. Scientists explain that the werewolf superstition is a belief in lycanthropy, the power which some persons were supposed to have of becoming wolves, or,

in some regions, the fiercest animal existing there. The basis of the superstition is the belief in transformation, but its special form is due to mental aberration, persons of diseased minds imagining they were wolves and, acting as such, preying on other humans.

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MEDICINE

Link Between Kidney And Ovarian Functions

➤ **EXISTENCE** of a hitherto unknown action of female sex hormones, which may be responsible for certain disorders of women, is indicated by experiments which Dr. Kurt A. Oster, director of the department of pharmacology in the research laboratories of McKesson & Robbins, Inc., reports in *Endocrinology*.

The experiments have demonstrated for the first time that there is a definite link between the kidney and ovarian functions, a fact often suggested by physicians who noted changes in the function of the kidney in the menstrual cycle and especially during pregnancy, the report reveals.

By using a stain with a specific affinity for a particular group of organic chemicals, Dr. Oster demonstrated that these substances occur in the normal kidney in a clearly defined distribution pattern. He found that the kidney exhibited varying degrees of staining in four zones which parallel the functional units into which physiologists have divided the kidney, and that the inter-cortico-medullary or ICM zone tends to lose and then regain its deep staining quality in synchronization with the cycle of the egg in the ovary.

During pregnancy, the stain disappears from this kidney zone almost entirely, and with the resumption of the normal ovarian functions, the cyclic nature of the staining returns, he found.

Dr. Oster concluded that this phenomenon indicates a disappearance and reappearance of a chemical in the kidney cells, rather than an alteration of cell structure, since a structural change can be demonstrated with ordinary staining methods.

Preliminary experiments conducted by Dr. Oster indicated that ovarian hormones alone are responsible for the change in the kidney.

The studies described in the paper have been going on in the McKesson laboratories for nearly two years under the direction of Dr. Oster with the assistance of Miss Jean G. Baum.

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HORTICULTURE

New Orange Variety Ripens 5 to 8 Weeks Earlier

➤ **ORANGES** from Florida may reach Northern markets a month, or even two months, earlier than they now do, once a new variety on which U. S. Plant Patent 657 has been issued becomes more widely propagated. The new variety originated as a bud sport in the top of a tree of one of the standard orange types, in the grove of the late Harold E. Cornell of Winter Haven. He propagated it by grafting, and since his death his widow, Mrs. Thelma Cornell, has carried on the work.

The one thing that distinguishes this tree in appearance is a tendency to thorniness; the fruits, medium to large in size, look and taste very much like other high-quality oranges. But they have the great advantage of ripening from five to eight weeks earlier than any other known Florida orange variety.

Science News Letter, April 28, 1945

ANIMAL HUSBANDRY

Hens Lay Better In Artificial Light

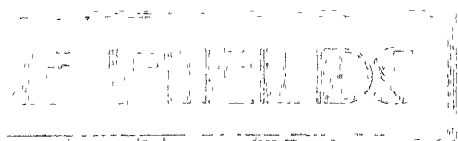
➤ **ARTIFICIAL** light in the henhouse means more money to the farmer, experiments in the poultry department at Cornell University indicate.

Tests for the first year show that 125 pullets of high-producing strains receiving artificial light produced 26,085 eggs, or 2,757 more than the same number of pullets without lights. Eggs from the former sold at retail for \$1.045, or \$45 more than for the latter. The additional income from each pullet was \$1.

One flock received no light in the 13-month test period, and the other was lighted from Sept. 15, 1943, to April 25, 1944, and again from Aug. 15 to Oct. 15, 1944.

The lighted flock laid 3,260 more eggs than the unlighted one from September to April, when egg prices are higher, but 503 fewer eggs during the rest of the period. Part of this difference, according to F. E. Andrews of the poultry staff, was due to a somewhat higher mortality in the unlighted flock during the early part of the laying year.

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BIOCHEMISTRY

Fungus Found to Be Source Of Vitamin B Complex

➤ A FUNGUS that causes one of the most destructive of plant diseases, flax wilt, has been found to be a potential source of most of the B vitamins, in researches by a four-man team in the laboratories of Fordham University.

The fungus, known to botanists as *Fusarium lini*, was grown in quantity on a stock culture medium containing glucose. The matted growth was ground up after being dried, and added to a vitamin-deficient diet fed to rats. It was found necessary to add thiamin (vitamin B₁), but the dried mold-like substance proved an adequate source of other vitamin B constituents, "comparing favorably with brewer's yeast."

Collaborating in the research, which is reported in *Science* (April 13), were Leonard J. Vinson, Prof. Leopold R. Cercedo, Robert P. Mull and F. F. Nord.

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ENGINEERING

Color Speeds Production Of Army's B-32 Dominator

➤ THE ARMY'S new B-32 Dominator superbombers are flying into the blue skies at an increasing pace as the result of color control systems on the assembly lines that improve the safety features and operating ease of many machines at Consolidated Vultee Ford Worth plant.

All machines in the entire plant are painted a sea-water green that is easy on the eyes and makes the production areas seem more cheerful to workers. Working areas on the machines are all painted yellow, so that when a plane builder sees a yellow section on a machine he knows that it contains moving parts of which he must beware when the machine is in operation. Red paint is used on all electrical switches and buttons that control the machines.

In addition, each one of the ten work stations along the assembly line is designated by a different color. The color for each station is clearly shown by a color control board, showing work to be performed, hung beside the plane itself. Thus a continual visual reminder is provided of every job to be performed and

who is to do it. The boards are made up of small removable strips of paper on which information is printed so that as assembly instructions change, the color boards can be kept up to date.

Employees, too, are aided by the color system. Accustomed to the color boards, they waste no time in trying to determine just where station No. 1 or No. 6 or No. 10 might be. All they need do is glance at the board.

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GENERAL SCIENCE

Drafting Young Scientists Endangers War Effort

➤ DRAFTING the country's younger scientists away from their laboratories and classrooms to throw them into action as combat troops endangers both the present war effort and the postwar job program, warns the American Association of Scientific Workers in a statement issued under the signature of Dr. Harry Grundfest of Princeton University.

The Association's protest is provoked by the recently established Selective Service policy, of reclassifying research students and laboratory workers in the 18-to-30 age group and inducting them into military service. It is also expected that the 30-to-38 age group will be called up soon.

The Association's statement comments:

"Unless these steps are halted, scientific personnel on college staffs and on research projects of less immediate importance to the prosecution of the war will shortly be swept into the armed forces. In terms of manpower, the total number of people involved is small. Induction or deferment of these groups can do little, therefore, to affect the requirements of the armed forces.

"In terms of the loss to society and to science, however, the induction of these younger scientists will bring about a grave situation. It will deprive society and science of a group which is probably at the height of its originality and promise. It will furthermore seriously curtail the teaching facilities of the colleges, and thus bring about a still greater deficit in the postwar supply of scientists."

"Officers of the Association have made representations to War Manpower Commissioner McNutt, Selective Service Director Hershey, and to various scientific bodies. They have also issued a general call to scientific societies, to colleges and universities, and to individual scientists, to make their protests felt.

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RESOURCES

Present Supply of Kapok Will Be Gone in 8 Months

➤ LIFE JACKETS and life preservers used by the armed forces and merchant marine will soon be packed with a new fibrous glass material as the 10,000,000-pound stockpile of kapok, and substitutes such as milkweed fiber and Ecuador kapok, threatens to become depleted by the end of this year, reports the U. S. Coast Guard.

Selected as the best substitute for kapok life-jacket filler after exploratory tests had been conducted on a number of materials at the Mellon Institute of Industrial Research, fibrous glass has many superior qualities. It is fireproof, more resistant to being packed down under compression, and does not absorb water as rapidly as kapok.

Before the war, America imported up to 10,000 tons of kapok annually. Most of it came from Java, and this source of supply was cut off when that country was invaded by the Japs. A soft, fluffy fiber, kapok is secured from the pods of the bombax tree. The clumps of fiber were removed from mature pods, cured in the sun and compressed into bales by native labor.

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RESOURCES

Mountain Leather May Have Many Commercial Uses

➤ MOUNTAIN leather, a type of asbestos that has been only a museum curiosity in the past, is now found adaptable to industrial uses, particularly in filtering, sound-proofing and shock-absorbing materials. A deposit of limited size has been discovered near the entrance to Glacier bay, Alaska, and experiments, conducted by the U. S. Bureau of Mines, give promise of possible wide commercial uses.

This native material is known to geologists as paligorskite. When dry it is light in weight, tough, resembles buckskin, and tears somewhat like heavy cardboard. Upon wetting, it absorbs considerable water, swells and becomes soft, can be torn easily, resembles paper pulp, and is slimy to touch. In this condition it can probably be converted to a pulp in conventional paper-mill beaters, and then formed into many lightweight, acid- and fire-proof products.

A special report on mountain leather and its possible uses has been issued by the Bureau.

Science News Letter, April 28, 1945

ASTRONOMY

Lion Now High in Sky

This constellation shines high in the southwest on May evenings, made even more conspicuous than usual by presence in it of the bright planet Jupiter.

By JAMES STOKLEY

► **HIGH** in the southwest on May evenings shines the constellation of Leo, the lion, made even more conspicuous than usual by the presence in it of the bright planet Jupiter. This exceeds in brilliance the star Regulus, brightest permanent member of the group. Jupiter is now of magnitude minus 1.8, which is some 17 times that of Regulus.

A part of Leo that is characteristic is the so-called "sickle" with Regulus at the end of the handle, the point of the blade curving toward the western point of the horizon. To the left of the sickle is a triangle of stars which is supposed to mark the lion's hindquarters. The easternmost of these is called Denebola, a corruption of an Arabic name meaning the lion's tail. The line of stars that comes down towards Jupiter marks one of the animal's hind feet, so the planet is an extra object in this part of his anatomy.

Next to Leo, to the east, is Virgo, the virgin, in which Spica appears. This group, and its neighbors, are all shown on the accompanying maps, which depict the skies about 11:00 p. m., your local war time, on May 1, and about 10:00 p. m. in the middle of the month.

Atmosphere Absorbs Light

Another first magnitude star in the southern sky is shown in Bootes, the bear-driver, which is above the easternmost end of Virgo. Low in the southeast there is indicated a part of Scorpius, and the star named Antares. This is one of the first magnitude also, but the symbol used for it on the map is that for the third. The reason is that it is so near the horizon that much of its light is absorbed by the earth's atmosphere, dimming it considerably. A few months from now it will be higher in the evening sky, and then it will be seen in full brilliance. Even in May it can be seen as high and as bright—in the early morning hours.

In the northern half of the sky some more first magnitude stars and another planet are shown. Saturn is the planet, low in the northwest, in the figure of Gemini the twins where we also see the star Pollux. To the right of Gemini is Auriga,

the charioteer, with Capella. In the northeast there is Vega, in Lyra, the lyre; and Deneb, in Cygnus, the swan, also dimmer than it should be because of its low altitude. In the evenings of coming months these last two figures will get higher, and their stars brighter, while those in the northwest will then be gone from view for a while.

The big dipper, part of Ursa Major, the great bear, is now in nearly its best evening position of the year, high in the north. The "pointers," part of the dipper, show the direction to Polaris, the pole star, and the little dipper, which extends upward from it. Winding around the little dipper, from a position close to the pointers, is Draco, the dragon, which can also be seen well on May evenings.

Low in the east, just before sunrise, two other planets may be seen. Venus, which was so brilliant in the western evening sky during the past winter, has shifted to be a morning star, and it is easily found in the morning twilight. By the end of the month it will be about 18° above the horizon at sunrise. On May 21 it will be at maximum brightness, minus 4.2, which is nearly ten times as bright as Jupiter. Mars also is seen in the east, about 18° above the horizon at the beginning of the month, and is of magnitude 1.3, the same as that of Regulus. Mars and Venus will draw closer and closer together until, early next month, they will be about 5° apart (which is a distance about 10 times the diameter of the full moon). Then they will separate again. Mercury also will come into the

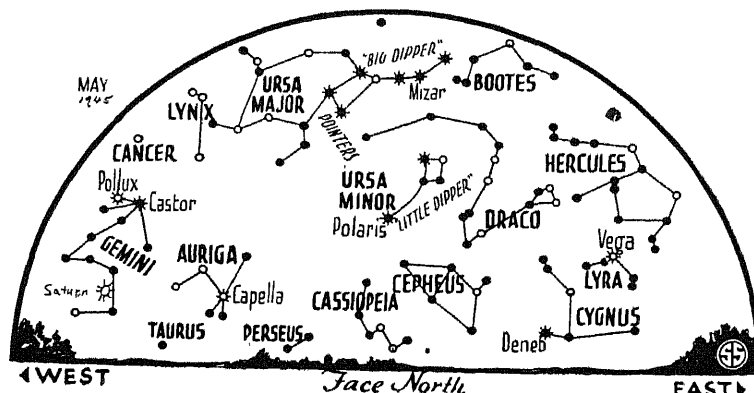
morning sky about May 11, but hardly enough to be seen, for even then it will rise less than an hour before the sun, and will be lost in his glare.

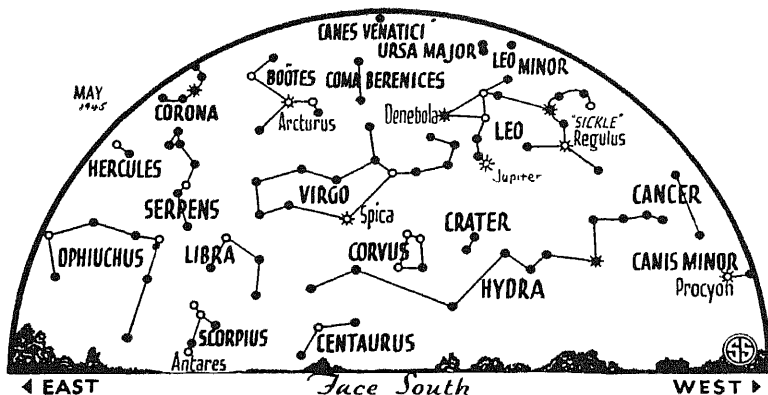
Directly overhead at the times for which our maps are drawn, there stands the constellation of Canes Venatici, the hunting dogs, one of several new figures added in 1690 by the Polish astronomer Johannes Hevelius, of Danzig, to fill some areas where the ancients had not bothered to put constellations. The brightest star in this figure, which stands at the approximate center of the arc of the circle formed by the great dipper, is called Cor Caroli. This was so named in 1725 by Edmund Halley, of comet fame, who was astronomer royal of Great Britain, in honor of Charles II. In doing this he followed a suggestion of the court physician, Sir Charles Scarborough, who said that it had seemed to shine with special brilliancy on the night of May 28, 1660, the eve of the king's return to London upon the restoration of the Stuarts after Cromwell had been overthrown.

Spiral Nebulae

Looking at this constellation with a telescope, a misty spot is seen near the star Alkaid, the one at the end of the handle of the great dipper, and a long-exposure photograph through a great observatory instrument shows it as having the appearance of a Fourth-of-July pinwheel. It is one of the finest of the spiral galaxies (formerly called spiral nebulae, before their nature was understood). Actually it is a vast assemblage of stars similar to that of which our sun and all the stars of the nighttime sky are part, and which make up the Milky Way Galaxy.

This region of the sky—Canes Venatici, and Coma Berenices, next to it—is particularly rich in these objects. The





* * * • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

Milky Way itself, where all other types of heavenly bodies are most numerous, is devoid of them. This was very puzzling to earlier generations but now we appreciate the reason. Our galaxy is a flattened disk of stars. As we look toward the edge of the disk we see many more stars than we do toward the flat sides, and this concentration of stars produces what we call the Milky Way.

Naturally, all the bodies that are members of our galaxy are most numerous in the Milky Way but they, and the clouds of dark matter that accompany them, obscure what lies beyond and is outside our galaxy. Consequently, external galactic systems, of which the one in Canes Venatici is a good example, are best seen toward the poles of the Milky Way, for in these directions there is less matter in the foreground to interfere. Millions of these other galaxies are known, and when the 200-inch telescope at Mt. Palomar is in use, a year or two after the

end of the war makes possible resumption of work on it, still vaster numbers will be revealed, and nearer ones will be seen better, adding to our knowledge of these "island universes."

Celestial Time Table for May

May	Ewt	
4	Early Morning	Meteors of eta Aquarid shower visible
5	2:02 a. m.	Moon in last quarter
8	Noon	Moon passes Mars
9	6:53 a. m.	Moon passes Venus
10	2:00 p. m.	Moon nearest, distance 223,200 miles
11	8:00 a. m.	Mercury farthest west of sun
	4:21 p. m.	New moon
14	10:31 p. m.	Moon passes Saturn (in the southwestern part of the country Saturn will be occulted or "eclipsed")
18	6 12 p. m.	Moon in first quarter
20	6 53 a. m.	Moon passes Jupiter
21	11:00 a. m.	Venus at greatest brilliance
22	9:00 p. m.	Moon farthest, distance 252,000 miles
26	9.49 p. m.	Full moon

Subtract one hour for CWT, two hours for MWT, and three for PWT.

Science News Letter, April 28, 1945

MILITARY SCIENCE

Underground Factories

Many of them have been discovered by Reds in liberated areas. Using idle mines for war purposes was suggested by a German magazine a decade ago.

➤ A SECRET Nazi underground is offered as a postwar threat, but an extensive German underground factory force has been hard at work since early in the days of Allied air invasions and has produced great quantities of war material in well-equipped industrial plants in former coal, iron and salt mines, and in underground caverns excavated for this single purpose.

How many of these underground factories there may be, and how great their

output, is unknown, but Soviet soldiers have discovered a considerable number in liberated and German areas. Information about some of them is given in a recent official information bulletin issued by the embassy of the Union of Soviet Socialist Republics.

The largest underground enterprises were discovered in German territory in a forested area, the report states. It was a huge plant for the assembling of aircraft, a branch of one of Germany's

largest airplane manufacturers. When taken, everything was in perfect condition, undamaged by the hurriedly re-treating workmen and Gestapo watchmen.

In the Budapest area in Hungary, a vast aircraft engine plant was discovered in ancient and little-known catacombs which extend a distance of some three miles. The engines were for a Messerschmitt factory, also located in the Budapest area. In the Poznan (Posen) area in Poland, underground shops were built by the Germans in the forts of an old fortress. Many of these forts had gigantic underground edifices two and three stories deep. Factory equipment evacuated from Bremen was installed in them.

These are but a few of the underground factories and storage places found by the Reds. Many others were discovered in France by the Allies, and more are now being located by Americans and British in Germany itself. The use of the salt mine at Merkers for the storage of German gold and works of art is another example of the German use of bombproof underground storage.

The military use of idle mines for



A king's ransom —paid in pepper!

IT IS STRANGE but true, that after Alaric took Rome, he exacted a tribute, not only of gold and silver, but of 2,000 pounds of pepper! This is one of hundreds of fascinating stories told by Anne Dorrance in her book about the transportation of seeds and plants from their original homes to the four corners of the earth. Grains, spices, rubber, quinine, fruits and vegetables have all made history in unsuspected ways. Here's the whole story, fascinatingly, and authoritatively told.



GREEN CARGOES

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DOUBLEDAY, DORAN



Do You Know?

Though *acacia gum* can be used for food it has but little nutritive value.

New U. S. *battleships* have 50 complete separate cooling systems.

Next to oxygen, *silicon* is the earth's most abundant element.

There are no unrationed *foods* in Japan.

Walnuts have been found around the Swiss lake dwellings of the Neolithic Age; date, 7000 B. C.

The outlook is good for seeds, fertilizers and insecticides for 1945 *Victory gardens*.

North America has over half the world's known supply of *bituminous coal*.

Very fine *garnet powders* are now being used in optical glass polishing because of the war shortage of corundum.

The Texas *nighthawk* is the most northern member of a tropical species that ranges widely through Central and South America.

Titanium and zirconium, best known for their alloys with steel, are also used to alloy with copper, producing a substance comparable with tin bronzes.

Phosphorus burns are treated successfully with a solution of 1% permanganate of potash and 3% bicarbonate of soda, it is reported.

Porcelain *enamel* can be called a glass-metal combination, that is, metal coated with glass for its protection and decoration.

Eggs, coated with a film of highly refined, colorless, paraffin-base oil, may be preserved for months at 31 degrees Fahrenheit.

The speed of *sound* is somewhat less at high altitudes than at the surface of the earth because of the lower temperature and lower air density.

Termites that feed on wood are able to do so because they have within them one-celled animals known as flagellates that live in their intestines and digest the wood for them.

From Page 267

storehouses of war equipment and for underground factories was suggested in 1935 by a German magazine, the report states. Before the war the foreign press frequently mentioned German construction of underground stores, oil dumps and hangars. The new structures were built by one organization and with a uniform plan. These were operated by forced labor from overrun countries and controlled by the Gestapo.

Science News Letter, April 28, 1945

CHEMISTRY

Tent Cloth Wears Longer, Has Greater Strength

➤ TENT CLOTH has been developed which, through the use of new synthetic resins, wears longer, has greater strength, and resists weathering and fungi better than prewar duck.

The compound in which the cloth is bathed makes it waterproof by sealing the relatively open weave. By acting as a binder and carrier for the flame-proofing and fungus-resisting agents, it protects the cloth against fire and deterioration.

A group of resins known as the paraffin complexes were used to coat the canvas, which remains flexible at sub-zero tem-

peratures. These resins, one of a group of tacky, adhesive resins made from unsaturated fatty acids and glycerol, are more rubbery and non-oxidizing than the oil-modified type.

A rosin-modified phenolic resin was used to carry the pigment. It possesses a high melting point, intrinsic hardness, and releases solvents rapidly, of particular importance to the manufacture of tent cloth.

In all, over ten different ingredients were used in carefully controlled quantities.

In the early stages of the war, mildew destroyed one-fifth of all fabrics shipped to the South Pacific. The wide range of weather and service conditions found in various theaters of war called for a material that would remain flexible at sub-zero weather, be completely water- and weather-proof, and retain color well. Already familiar with synthetic resins from their earlier experience in making book cloth and artificial leather, the L. E. Carpenter Company, with the cooperation of the Resinous Products and Chemical Company, devised a coating compound for tent cloth that would fill the bill.

By unrolling the fabric as it comes from the textile mills and stitching the end to another roll, a continuous coating operation has increased the output 40%.

Science News Letter, April 28, 1945

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See and Shun!

➤ POISON IVY victims begin to become numerous at about this time of year, and they will continue so until frost strips the wicked vine of its foliage. It is sometimes stated that poison ivy is at its most virulent when in bloom; but most of the afflicted ones can find no seasonal differences in their miseries. Just as many blisters and as much itching in August as in May, they declare.

The malaise of ivy poisoning—ranging from relatively mild discomfort in some to acute and prolonged suffering in the more sensitive—can be largely obviated by attention to a few simple precautions. As in all afflictions, prevention is better than cure, and avoidance of the cause is the key to prevention. Learn to recognize poison ivy at sight, and keep away from it whenever you see it, and you will reduce the number of attacks per season—perhaps eliminate them altogether.

Poison ivy is easily recognizable by its three-parted compound leaf. It is the only abundant shrubby plant in the woods with that kind of leaf. Flowers are small, greenish-white, thickly clustered; they are followed by berries that become a slightly soiled parchment-white when ripe.

For the Eastern species, there is no valid distinction between poison ivy and poison oak, which is sometimes attempted on the basis of leaflet-shape. Leaflet margins range all the way from entire to deeply notched or lobed—sometimes on different parts of the same vine. Poison ivy is an exceedingly variable species. The name poison oak is properly applied to the Western species, which is plentiful in the foothills of coastal mountain ranges, and is also found less abundantly inland.

Properly speaking, poison ivy is a

vine. In humid woodlands it climbs trees and clambers over rocks and stone fences, clinging by means of innumerable aerial roots. In slightly drier terrain, it disguises its character by running the main stem of the vine along or just under the ground surface, sending up numerous branches that range from a few inches to four or five feet in height, so that it is often described as a shrub. But it's all the same old pesky poison ivy.

Several hundreds of remedies for ivy poisoning have been proposed, almost all of them completely worthless. A few years ago U. S. Public Health Service

scientists developed an ointment containing 10% sodium perborate and 2% potassium periodate in a cold cream base, which is said to be very effective in most cases.

There is also a good preventive treatment, which persons who know themselves to be susceptible can put on before going into the woods. It consists simply of a 5% solution of ferrous sulfate in a half-and-half mixture of water and ethyl alcohol; a little glycerin may be added to keep it from feeling too dry as it evaporates on the skin.

Science News Letter, April 28, 1945



Valentino Saria made the above two photographs with two cameras with simultaneous and equal exposure.

"Balcote" Revolutionizes Optical Science



To build lens systems that would let more light through . . . that would eliminate the light loss and the "flare" caused by internal reflections . . . that would give sharper, clearer, more brilliant images . . . has been the objective of scientists for years.

Long before the war, Bausch & Lomb had developed methods of coating lenses to reduce reflections and permit the passage of more light. As a result, Bausch & Lomb, in 1939, introduced B&L Super Cinephor Projection Lenses with antireflection coatings. These lenses were used in projecting the Technicolor motion picture, "Gone With The Wind." They passed 30% more light, made possible the richer, deeper colors on a larger screen.

A further improvement of this same coating, today known as *Balcote* and recognized as among the best and most permanent available, is used on B&L Photographic Lenses, other military optical instruments, and wherever light transmission is a problem. In wartime binoculars, the use of *Balcote* has meant an increase of as much as 54% in brilliance. Bausch & Lomb Optical Co., Rochester 2, N. Y.

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Books of the Week

➤ **WITH THE WAR** nearing its end, thoughtful men are looking ahead to the struggle that must succeed the military phase the great effort needed to keep the peoples of the world fed and clothed, that peace may last and chaos be avoided. Prof. Karl Brandt of Stanford University boldly tackles the toughest of the post-war problems in **RECONSTRUCTION OF WORLD AGRICULTURE** (Norton, \$4). Major attention is focussed (as perhaps it should be) on Europe, though other regions are not neglected. Like most mature economists, the author holds to a liberal doctrine.

Science News Letter, April 28, 1945

➤ **MUMMIES**, by Richard A. Martin, is the newest addition to the Field Museum's interesting and well-illustrated series of pamphlet publications. It is much livelier than its title might seem to indicate. (*Chicago Natural History Museum*, 25c.)

Science News Letter, April 28, 1945

➤ **WEATHER AND CLIMATE** have assumed larger importance in everyone's eyes since the war has forced a wider world consciousness upon us. It is safe to predict that the many college courses in these subjects that have been instituted will not all be abandoned. Which makes timely the coming of a competently written text and reference book like **CLIMATOLOGY**, by Bernhard Haurwitz and James H. Austin (McGraw, \$4.50).

Science News Letter, April 28, 1945

➤ **METHODS IN CLIMATOLOGY** is a text for the training of the new generation of researchers in that subject which the postwar world is going to need. Some knowledge of mathematics (but not too much) is pre-

requisite to work with this book. (Harvard, \$4.)

Science News Letter, April 28, 1945

➤ **FORESTRY** has long been an important profession in the United States, in postwar times it must become more important still, if this country is to maintain its position in the world. In **YOUR FORESTS**, Martha Bensley Briere presents a strong appeal for the expansion of the American conservation policy, and at the same time presents the facts and problems of forestry in such a way as to make a strong appeal to young people. (Lippincott, \$2.50.)

Science News Letter, April 28, 1945

➤ **CATTLE BREEDING** is still a good deal of a mystery to many farmers who must needs practice it. With the laudable aim of making the biological processes involved more comprehensible, James E. Russell presents, in **HEREDITY IN DAIRY CATTLE**, a simple, practical text that can be used with or without benefit of classroom presentation. It is intended particularly for use by 4-H and FFA dairy clubs. (*American Guernsey Cattle Club*, \$2.50.)

Science News Letter, April 28, 1945

➤ **NAVAL EVENTS** crowd upon each other's heels so fast in time of war that even the latest books in the field of naval construction and strategy are a bit "dated" by the time they can appear in print. Such a fate has overtaken **BRASSEY'S NAVAL ANNUAL** for 1944, in which events down to the end of 1943 are chronicled. Despite this handicap, however, the book is a "must" for any library that pretends to completeness in its field. (Macmillan, \$5.)

Science News Letter, April 28, 1945

➤ **CALIFORNIA'S** tremendous variety of topography and climates greatly complicates the task of anyone who undertakes the study of animal and plant distribution in the state. Zoologists generally and ornithologists in particular will long be grateful debtors to Joseph Grinnell and Alden H. Miller, who in **THE DISTRIBUTION OF THE BIRDS OF CALIFORNIA** give exact and well-documented data, species by species, supplemented with numerous maps. (*Cooper Ornithological Club*, Berkeley, \$7.)

Science News Letter, April 28, 1945

Just Off the Press

ANNUAL FLOWERS FROM SEED PACKET TO BOUQUET—Dorothy H. Jenkins—Barrows, 223 p., illus., \$2.75.

CARNEGIE INSTITUTION OF WASHINGTON, Year Book no. 43, July 1, 1943—June 30, 1944—Carnegie Inst., 206 p., illus., paper, \$1; cloth, \$1.50.

THE CHEMICAL PROCESS INDUSTRIES—R. Norris Shreve—McGraw, 957 p., illus., \$7.50.

COMPARISON OF CLIMATE OF THE UNITED STATES AND EUROPE WITH SPECIAL ATTENTION TO POLAND AND HER BALTIC COAST—Wladyslaw Gorczynski—Polish

Institute of Arts and Sciences in America, 288 p., illus., \$5, (Polish Institute Series no. 7).

THE DYNAMICS OF CULTURE CHANGE, an Inquiry into Race Relations in Africa—Bronislaw Malinowski—Yale Univ. Press, 171 p., \$2.50.

FUNDAMENTALS OF PHYSICS AND THEIR APPLICATIONS IN MODERN LIFE—Bowen C. Dees—Blakiston, 486 p., illus., 69c.

HUMAN NATURE AND ENDURING PEACE, Third Yearbook of the Society for the Psychological Study of Social Issues—Gardner Murphy, ed—Houghton, 475 p., \$3.50.

NATIONAL BUDGETS FOR FULL EMPLOYMENT—National Planning Asso., 96 p., paper, illus., 50c, (Planning Pamphlets nos. 43 and 44)

NATIVE PEOPLES OF THE PACIFIC WORLD—Felix M. Keesing—Infantry Jour., 134 p., paper, illus., 25c; for sale to members of the Armed Services only, (Fighting Forces Series).

PENICILLIN THERAPY, Including Tyrothricin and Other Antibiotic Therapy—John A. Kolmer—Appleton, 302 p., illus., \$5.

SCIENCE TODAY AND TOMORROW—Waldemar Kaempffert—Viking, 279 p., \$2.75, (Second Series).

THE SHAPING OF PSYCHIATRY BY WAR—John Rawlings Rees—Norton, 158 p., \$2.50.

TANKS AND ARMORED VEHICLES—Robert J. Icks—Duell, 264 p., illus., \$4.75.

TOWARD A PERMANENT PEACE—American Nobel Center, 93 p., paper, \$1.

Science News Letter, April 28, 1945

ENTOMOLOGY

Original Insect Wings May Have Been Misplaced Legs

➤ **SUGGESTION** of a solution for one of science's oldest riddles—Where did insect wings come from?—is offered by the appearance, in experimental colonies of fruit-flies maintained at the University of California, of insects with legs where their wings ought to be. An explanation of this sudden evolutionary change, or mutation, which is hereditary, is offered by Prof. Richard B. Goldschmidt in *Science* (April 13).

An especially interesting feature about the misplaced legs is that they are three-jointed instead of being four-jointed like normal insect legs. This fits in with a theory that has been advocated in the past, that insect wings, despite their apparent one-piece construction, are basically three-jointed appendages. It also lends support to the idea that at some time in the remote past, insect wings originated by an evolutionary transformation of legs.

Science News Letter, April 28, 1945

To hold their vitamin C, carrots must be kept both cold and moist.



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NUTRITION

Vitamins for Doughnuts?

Vitamin loss in deep fat frying studied. Doughnut consumption on increase but number eaten is a factor in considering enrichment.

► DOUGHNUTS, with triple the popular appeal they had in 1929, seem now to be making a bid for favor on the nutritional score. That appears to be the story back of a scientific study of vitamin losses during deep fat frying reported by Dr. Gladys J. Everson and Dr. Arthur H. Smith, of Wayne University, Detroit. (*Science*, March 30)

When the Red Cross and other organizations hand out doughnuts and coffee to men in the armed forces, nutritionists wish they could give something as tasty and easy to serve that contained more vitamins and minerals. And nutritionists generally advise all of us to eat a better breakfast than one consisting solely of doughnuts and coffee. The doughnuts contribute calories for energy, but the doughnut and coffee breakfast is short of vitamins and minerals.

White bread for breakfast toast used to have the same nutritional fault of lacking vitamins and minerals. Now it is enriched by addition of three B vitamins, thiamin, niacin and riboflavin, and the mineral, iron.

Why not enrich doughnuts, too, is the question naturally asked by those who make them and those who like to eat them. One answer was that the deep fat frying by which doughnuts are made would cause a loss of thiamin, which does not survive heat well.

In a study supported by a grant from the Doughnut Corporation of America, Drs. Everson and Smith found that when doughnuts are made by the usual commercial process from enriched flour, which is one way of making enriched bread, there was lost 22.9% of the thiamin and 20% of the niacin but no appreciable amount of riboflavin or of iron.

Some thiamin is lost from bread in the baking. The average loss is about 15%, but the 22.9% loss reported for the doughnuts is within the range reported for thiamin loss in bread. Niacin, the pellagra-preventing vitamin, however, is not lost in the baking of bread as this vitamin stands up well under heat.

Waste of vitamins, because of the loss in processing, has been one argument against enriching doughnuts, crackers, cake, spaghetti and macaroni.

The number of doughnuts eaten by the average person also comes into the picture. Drs. Everson and Smith state that in 1929, according to sales records, 201 millions of dozens of doughnuts were sold. In 1943 the figure was 665 millions of dozens. In 1944 the Red Cross distributed 84,130,960 doughnuts, approximately, to members of the armed forces in all theaters. That is a lot of doughnuts, but if divided equally it would come to less than a dozen doughnuts a year for each GI. Similarly, the 1943 total gives one doughnut a week for each of the 130,000,000 or 140,000,000 persons in our population.

Even leaving out infants and non-doughnut eaters, some nutritionists think doughnuts do not constitute a large enough part of the daily diet to make enrichment advisable. The average person consumes much more bread than doughnuts daily, it is argued, so bread is considered the product to be enriched from the standpoint of improving national nutrition.

GIs and others in the services who may consume a large proportion of the 665 million dozen or more annual doughnut fry probably will continue to get their doughnuts, enriched or non-enriched, there being no satisfactory substitute. Maybe someone can work out a substitute full of vitamins in time for the next war.

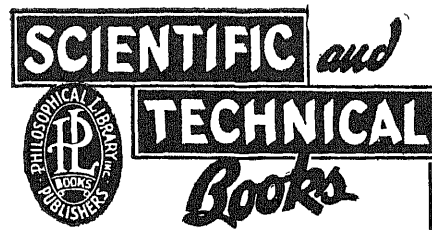
Science News Letter, April 28, 1945

AGRICULTURE

New Weed Killer Is More Effective Than Oil

► A NEW chemical weed-killer has been developed at the University of California's College of Agriculture, Prof. A. S. Crafts announces in *Science* (April 20). It carries the rather long descriptive title of 2,4 dinitro 6 secondary butyl phenol. Emulsified with a little oil and a lot of water, it has been found very effective against weeds that resist the all-oil sprays now in general use. It is less inflammable and less expensive to transport than oil, and safer to use than arsenical weed-killers, in areas where livestock are pastured.

Science News Letter, April 28, 1945



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J. B. Sidgwick

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• New Machines and Gadgets •

✿ **OUTLINES** on drawings in a child's paint book help prevent the overspread of the colors by an ingenious method. The lines are printed in ink and resin is applied to the wet ink. If then heated, the lines swell or puff up, forming barriers or dams between the various sections of the drawing.

Science News Letter, April 28, 1945

✿ **GASPROOF PACKAGES** for food, to protect against poisonous war gases, is made of nylon heat-sealed about the package of food and coated with a polyvinyl alcohol composition. The nylon resists puncturing and protects against air, the polyvinyl against the poison gases.

Science News Letter, April 28, 1945

✿ **MESSAGE CONVEYOR**, by use of which messages may be dropped from airplanes day or night, consists of a tube to hold the message, a parachute which normally is folded around the tube but opens in descent, and a flashlight with battery inserted in one end of the tube for night dropping.

Science News Letter, April 28, 1945

✿ **CELLULOSE BANDS** that change color when heated are put around the necks of blood transfusion bottles. When the bottles are sterilized, the bands turn from green to orange, thus guarding against using unsterile bottles and the consequent wastage of blood.

Science News Letter, April 28, 1945

✿ **INSTRUMENT** bases and parts are now made of a new plastic developed



for the Navy, with good electrical properties and resistance to fire and shock. Instrument parts, shown in the picture, do not give off toxic fumes under high heat. The plastic contains asbestos as an inorganic filler.

Science News Letter, April 28, 1945

✿ **CRUTCHES** on ice will not slip if equipped with a spike and a spike-holding device that may be attached to ordinary crutches. The spike projects when pushed out by a rod extending to the gripping handle of the crutch, and is withdrawn by the same rod. The top of the rod locks in an eye.

Science News Letter, April 28, 1945

✿ **COMBINATION** trunk and cot, recently patented, has a four-section, foldable, canvas-covered, light-metal frame that fits into the trunk's top. When opened, the body of the trunk supports the center of the cot, the trunk's lid supports the head end, and hinged legs support the rest.

Science News Letter, April 28, 1945

✿ **SANDING DEVICE** for automobiles, recently patented, uses the heat of the exhaust gases in a combined muffler and sand reservoir to keep the sand warm, dry and in a flowable condition. The sand reservoir is completely surrounded with an outer chamber through which the gases flow.

Science News Letter, April 28, 1945

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SCIENCE NEWS LETTER



THE WEEKLY SUMMARY OF CURRENT SCIENCE • MAY 12, 1945



CHANGING THE
Imperial Argentine Air Force and Navy
New Deal

Added Power
See Page 296

A SCIENCE SERVICE PUBLICATION

Japs—Fear—Island Fighting Weapons—Survival—Psychology

★ THE JAP SOLDIER . . .

in text and accompanying photographs tells how the Jap has been brought up and what he has been taught to believe, about his pre-induction training and how he fits into the Japanese military system, and about his fighting qualities as reported by accredited observers. This book was prepared by Major Arthur Goodfriend and is an adaptation of a training film strip produced by the Army Service, Time, Inc. and Wilfrid Fleisher cooperated in the preparation. 124 pages, with every other page a photograph. Fighting Forces edition, 25c.

★ JAPAN and the JAPANESE

by the editors of Fortune is a clear exposé of things Japanese. Here in 166 pages is a brief story of their history and background, their emperor, their army and navy, their industry, their citizen-subjects and the feudal system under which they live. The book stresses the fact that the Japanese are the product of understandable cultural patterns formed from modern habits, ancient customs, and ordinary daily living. *Japan and the Japanese* will help you understand the enemy. Illustrated with 3 maps, 6 charts and 31 pictures, this Fighting Forces edition is 25c.

★ ISLAND VICTORY . . .

is the story of units of the 7th Infantry Division in their successful fight to wrest the southern part of strategic Kwajalein Atoll from the Japs. The battle story is given in a series of official interviews with all the men who fought, giving an entirely new kind of military history which comes as close to the whole truth about battle as is humanly possible. Illustrated with over a hundred maps and photographs, with an appendix which explains the method of getting interviews after battle. 213 pages. Fighting Forces edition, 25c.

The Infantry Journal is the monthly magazine of the U. S. Infantry Association. *The Journal* comes to more than one hundred thousand U. S. fighters and civilians all over the world. In addition, it ships books to soldiers, sailors and marines wherever they are.

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★ FEAR IN BATTLE . . .

by John Dollard is a study of fear and courage under battle conditions. It was done with the cooperation of 300 veteran soldiers of the Abraham Lincoln Brigade, who filled out a 44-page questionnaire designed to ferret out information about fear in battle. The results show that fear is a normal, inevitable reaction to danger and that controlled fear has the power to incite a man to useful action. This is a scholarly approach to the problem and an extremely helpful one. Charts accompany each page of this book on fear, with a practical summing-up to finish the book. 61 pages. Fighting Forces edition, 25c.

★ SURVIVAL—Land, Sea, Jungle, Arctic . . .

a manual prepared by the Airline War Training Institute gives practical and valuable advice to men forced down, or adrift or to men who have to live in odd parts of the world. This book tells among many bits of useful knowledge, what to eat and what to avoid eating, how to build shelters, how to get along with native people, how to treat illnesses, how to find direction without a compass, and most important, how to keep one's mind in shape during periods of disaster. 376 pages, 177 pictures with a complete bibliography. Fighting Forces edition, 25c.

★ WEAPONS FOR THE FUTURE . . .

by Captain Melvin M. Johnson, Jr. and Charles T. Haven is a history of American arms from the "Kentucky" rifle of the American Revolution to the modern agency of moving firepower, the airplane. The authors drive home the necessity in the future for American preparedness in new weapons and equipment. No longer can we go into war as we have in the past with a small force of regulars, armed with obsolete weapons. A hard-hitting, plain-spoken book of 152 pages. Fighting Forces edition, 25c.

★ PSYCHOLOGY for the RETURNING SERVICEMAN . . .

by a Committee of the National Research Council is a book about the problems of returning servicemen and their adjustment from military to civilian life. Possible solutions are suggested in some detail about getting new jobs, fitting back into old ones, choosing a wife or returning to a wife and children, and becoming a good citizen. The book discusses also the special problems of the wounded and the neuropsychiatrics in facing civilian life again. Written in every-day language, this is a practical and completely sound book. 253 pages, indexed. Fighting Forces edition, 25c.

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BACTERIOLOGY

Bacteriophage Now Visible

This foe of disease germs, formerly invisible, has now been seen through an ordinary light microscope as bright yellow pinpoints of light.

➤ BACTERIOPHAGE, formerly invisible foe of disease germs, has now been seen through an ordinary light microscope, Dr. Alvin W. Holer, of the New York State Agricultural Experiment Station, and Dr. Oscar W. Richards, of the Spencer Lens Company, Buffalo, report (*Science*, May 4)

When the electron microscope made it possible to see bacteriophage particles, scientists found that they were larger than the flagella of bacteria. Since the flagella, tiny whip-like affairs extending from bacteria, can be stained and seen under ordinary light microscopes, it seemed reasonable to suppose bacteriophage particles could, too.

This has now been done. First the bacteriophage was treated with auramin, a

dye, and radiated with ultraviolet rays. The bacteriophage particles then appeared through the microscope as bright yellow pinpoints of light in an otherwise dark field. With further study, Dr. Holer and Dr. Richards developed two more methods for making bacteriophage visible. These involved the use of stains, or dyes, one a modification of the acid-fast stain, and ordinary light.

With these methods and use of the new phase difference microscope, the scientists were able to work out the order of events in bacteriophage destruction of bacteria. The sequence agrees with that seen in a dark-field motion picture, made by Dr. A. J. Pipper, of Pretoria, South Africa, showing bacteriophage action on a strain of typhoid fever organisms.

Science News Letter, May 12, 1945



LENSES COATED—Mounted on a rounded panel inside a large bell jar, lenses for naval combat instruments are given a coating of magnesium fluoride in the optical shop at the Mare Island Navy Yard, Vallejo, Calif., to improve their light transmission and field definition characteristics. Jim DeMartini, chemist, is checking the thickness of the coating.

METALLURGY

Airplanes Dissolved

Whole sections of wings and fuselage are placed in a bath of caustic soda to speed up recovering of valuable aluminum from obsolete planes.

➤ RECOVERING valuable aluminum for re-use from crushed war-weary, crashed, or obsolete planes has been speeded up by a new process that literally dissolves the aluminum from whole sections of these planes. This new method, developed by the Aluminum Company of America in cooperation with the Air Technical Service Command, eliminates all need for sorting metals before the aluminum is melted down and gives an end product of pure, high-grade aluminum ready for reprocessing. The aluminum obtained from alloys and other metals coated with aluminum is for all intents and purposes the same as aluminum manufactured from bauxite.

Whole sections of wings and fuselage are placed in a bath of caustic soda. This caustic soda dissolves the aluminum in the planes, while any steel nuts and bolts, rivets, copper piping, bronze bushings, rubber or other non-aluminum parts are not attacked by the caustic and remain

in solid form. Aluminum alloying elements are not attacked by the caustic, and as is the case with other non-aluminum parts they can be removed readily from the sludge. Thus scrapped planes are taken apart quickly by chemicals, instead of by tedious hand labor.

After filtering out the solid impurities from the sludge, the aluminum bearing liquor is transformed into pure aluminum oxide by the Bayer process. This is accomplished by pumping the liquor into precipitating towers as high as six-story buildings and allowing it to stand and cool. In time, crystals of aluminum hydroxide begin to settle out. These crystals are removed and washed to free them of caustic soda. Then they are heated white hot in large rotating kilns to drive off any moisture and leave commercially pure aluminum oxide, or alumina. The caustic soda recovered can be re-used.

The aluminum oxide can be processed into any desired form by standard meth-

ods, about which there is nothing new. Other parts, such as rivets, rubber, and so on can also be salvaged.

The chemical stripping of aluminum from wrecked planes makes possible the conservation of the country's high-grade bauxite reserves and man-hours required to mine bauxite. If this process had been available at the time of the scrap aluminum drive in 1942, when housewives turned in to the government their aluminum pots, pans, and skillets, those cooking utensils could have been processed and used in aircraft construction. As it was, they were of little value, since the large number of different mixtures and alloys of aluminum used in cooking utensils made it impossible to identify and sort the vast quantity turned in. Most of this material was melted down into low-grade metal.

Science News Letter, May 12, 1945

MEDICINE

Refrigeration Treatment For 89 Days Saves Leg

➤ REFRIGERATION treatment for 89 days continuously saved a woman's leg from the amputation that would ordinarily have been required to save her life, Dr. Isidor Kross, clinical professor

of surgery at New York Medical College, reports. (*Journal, American Medical Association*, May 5.)

The patient had suffered from a chronic osteoarthritis of her right knee for four years. A few days after warming her feet near an oven, a blister opened by itself and discharged a yellow, watery fluid. Shortly thereafter almost the whole leg became involved in a serious infection and gangrene set in.

Sulfadiazine failed to help and had to be stopped because a rash developed on the patient's arms and face. At this time her doctor advised amputating the leg through the middle of the thigh to save her life. Dr. Kross, called as surgical con-

sultant, believed the operation should not be done, as it would involve cutting through infected tissue. Either gangrene of the stump or general poisoning seemed likely to result. Refrigeration treatment was tried, with success.

The 89 days during which the low temperature treatment was carried on is the longest on record for such treatment, Dr. Kross believes. He reports the case for this reason and because he found that when the treatment was stopped after shorter periods, the inflammation and gangrene started up again. The case, he states, shows the necessity for continuing the treatment until the infection is fully overcome

Science News Letter, May 12, 1945

neheit (which might be encountered on a desert) to minus 90 degrees Fahrenheit (a temperature sometimes experienced at high altitudes). These gyros can operate at all altitudes up to 40,000 feet and can run for 1,000 hours without servicing.

Science News Letter, May 12, 1945

Some plants flower only when the daily period of illumination is relatively short—that is, when the days are short and the nights long; when the light periods are long the plants remain vegetative.

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AERONAUTICS

Automatic Take-Offs

High-precision gyroscopes may make completely automatic flight, including take-off and landing, a reality within a short time.

► HIGH PRECISION gyroscopes can hold a plane on its preset course more accurately than a human pilot, and it is possible that within a short time completely automatic flight, including take-off and landing will be a reality. Flights have already been made with a gyroscopic device that permits automatic control of turns, banks and other aerial maneuvers, reports the General Electric Company.

All this means that one day you may be able to sit down in the cockpit, throw a few switches and set a dial or two, turn over the engines then lean back and let the plane fly itself. The gyroscopes that may make this kind of flying a practical reality are the same as those that are being used on ships and in certain types of aircraft instruments today and in war they direct torpedoes to their targets. Essentially, they all consist of a wheel, or a body, mounted on a shaft and arranged to be spun around at great speed. The first instrument built around a gyroscope was constructed in 1744, the report states.

One of the most recent uses for gyroscopes is in computers for aerial guns on the Boeing B-29 Superfortress and other aircraft. Here they help calculate the factors between the gun and the target, determining how far ahead of the enemy plane the gunner must shoot to have the bullet hit the fast moving target in space.

Regardless of gravity, magnetism or the earth's rotation, the gyroscope main-

tains a fixed direction of the spin axis. It resists any attempt to change its direction while spinning. When a plane or ship deviates from its course, the gyroscope, mounted horizontally, still points in a pre-set direction, permitting the automatic calculation of how far the craft is off its course. This is the principle of the airplane's directional gyro. Another gyroscopic device tells the pilot whether he is nosing up or down, even when he may be traveling through thick clouds and unable to see the horizon.

Indicating information such as this makes the gyro adaptable to robot devices for completely automatic flying. In such an installation there would have to be several gyros, each designed to do a special job. For example, when a plane gets off its course or is not in straight, level flight, the gyro would sense this and send an electrical message to an amplifier, where the message is converted into greater electrical energy and sent on to a power unit, such as a servo motor, that will move the controls and bring the plane back to its proper flying position and correct course. All this can be accomplished without any attention from a human pilot.

While some types of gyroscopes are spun by air, most of those in use today are electrically driven. Electrically-driven gyros are not limited by extreme altitudes and temperatures, and will operate satisfactorily from plus 160 degrees Fahr-

MEDICINE

New Type Blood Bank

Lives of mothers and babies will be saved by a new kind of blood donor's club. Members will all have Rh negative blood.

► MOTHERS and babies threatened with death because of a difference between the mothers' and fathers' blood will be saved through a new kind of blood donor's club being formed through the Paterson, N. J., Board of Health and the Passaic County Medical Society.

Creation of this unusual, if not first and only such club is reported by Dr. Frederick P. Lee, Miss Anna I. van Saun and Miss Evelyn L. Brown, of the Paterson Board of Health. (*Journal, American Medical Association*, May 5.) Miss van Saun is director of the Board of Health's laboratories.

Members of the club will all have Rh negative blood. Their names and addresses will be on file at the county medical society. Then when an Rh negative mother gives birth to a baby whose father is Rh positive, the doctor will know where to find blood to save the baby and perhaps the mother, too, without having to send out a call over the radio and through the newspapers.

The baby of an Rh positive father has Rh positive blood, but, before his birth, this sets up antibodies in the blood of his Rh negative mother which cause trouble, sometimes fatal, for both. The antibodies destroy the Rh positive blood in the baby's body. Doctors try to save the baby by replacing this with repeated transfusions of Rh negative blood which will not be destroyed by the antibodies. The mother may also be sick and need a blood transfusion after the baby's birth. She also must receive Rh negative blood.

The Paterson health department got into this unusual field at the request of the medical society. One of the largest hospitals in the city could not take on the job of making Rh tests for its blood bank. So the health department started doing it on all blood sent to it for premarital Wassermann tests and for Wassermann tests on expectant mothers. Lack of testing serum forced the health department to abandon the test on the

premarital blood specimens, but it is being done on the blood of expectant mothers. About 15% of these have been found Rh negative.

When the test shows the expectant mother's blood is Rh negative, the obstetrician is asked to request a sample of the husband's blood for testing. All but two husbands have cooperated. Of 98 tested, 80 were Rh positive and 14 Rh negative.

"Prospects for an Rh negative woman to secure an Rh negative husband are not very brilliant, it would seem," the scientists comment.

Science News Letter, May 12, 1945

ENGINEERING

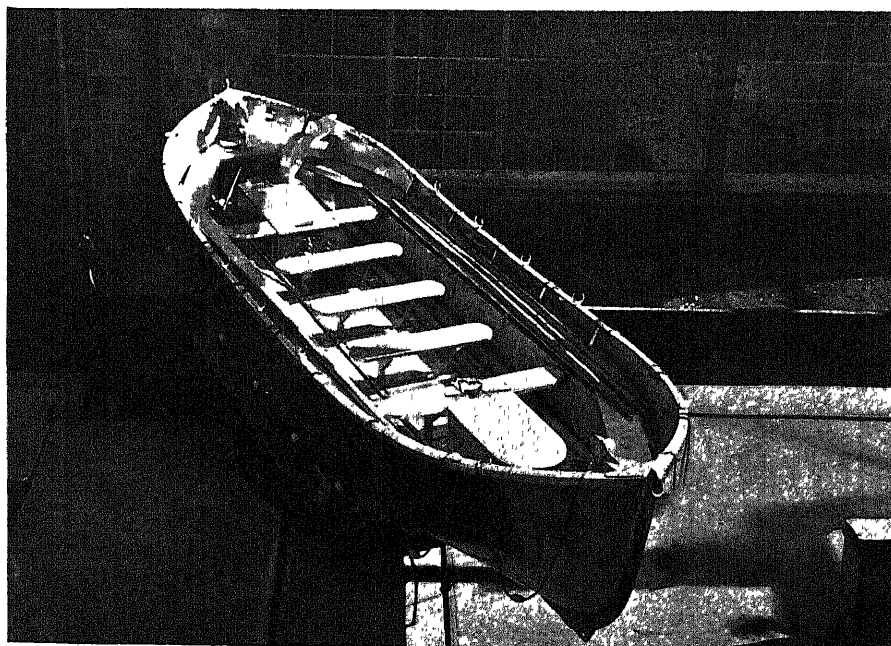
Aluminum Lifeboats Improve Ship's Stability

► A NEW aluminum lifeboat that weighs less than a wood boat and only half the weight of a steel boat of the same capacity has been approved by the U. S. Coast Guard for use on American merchant ships. It is resistant to action of such corrosive agents as salt spray and because of its lightness reduces the weight installed on the upper decks, thereby improving the stability of the ship.

Lighter-weight davits may be employed to handle the aluminum boat than those required for a steel or wood boat of the same capacity, since when loaded with the same sea rescue equipment, it weighs less than two and one-half tons. Most standard lifeboats weigh more. The equipment carried includes oars, seats for a large number of men, an axe, provisions for sustaining survivors until they are rescued, and may have an in-board motor.

Experimental lifeboats were built of aluminum over ten years ago. In 1938, one steamship company installed them on one of its craft, with good results.

Science News Letter, May 12, 1943



INCREASES STABILITY—The new aluminum lifeboat weighs less than other boats of the same capacity and is resistant to the action of such corrosive agents as salt spray. Because of its lightness it reduces the weight installed on the upper decks, thereby improving the stability of the ship.

PHYSICS

High Vacuum Research Fellowship Established

► A GRADUATE fellowship in high vacuum research has just been established at the Massachusetts Institute of Technology with funds donated by the National Research Corporation of Boston. An initial grant of \$2,500 has been made. It is expected that the award will foster interest in new processes performed under high vacuum in the fields of chemistry, physics, metallurgy, and chemical and mechanical engineering.

Science News Letter, May 12, 1945

ASTRONOMY

Eclipse Due July 9

Practically everyone in the United States will be able to see a portion of the sun blotted out by the moon. Total in Idaho and Montana.

► PRACTICALLY everyone in the United States will be able to see a portion of the sun blotted out by the moon on July 9. People who live in the West and Southwest, however, will have to get up pretty early, as the sun will rise partially eclipsed. People living in the East will have a chance to see the moon cover a section of the sun after it has risen.

A few in northern Idaho and Montana will be lucky enough to see the sun entirely hidden. It will rise completely eclipsed for observers in Cascade, Idaho, not far from Boise, and inhabitants of Butte, Mont., probably won't have to go farther than to a nearby field to see the total eclipse.

This is the first time since August, 1932, that the path of a total eclipse of the sun has been traced over territory close to our homes. Thirteen years ago the path of such an eclipse crossed New England.

The tip of the shadow of the moon will fully reach the ground just as the sun is rising for people in Valley County, Idaho. Sweeping over Butte, where the total eclipse occurs quite early in the morning, it travels northeastward, crossing into Canada. Racing across Saskatchewan and Manitoba, the eclipse will last about 48 seconds on the shores of Hudson Bay.

At Scoresby Sound, on the east coast of Greenland, mid-totality will occur near noon. The total eclipse will be longest here, reaching its maximum of one minute 16 seconds, according to the Nautical Almanac Office of the U. S. Naval Observatory. Here the path will have its greatest width, about 58 miles, when the sun will be a little over 42 degrees above the horizon.

From Greenland the path of the shadow of the moon will go to Norway, Sweden and Finland, where the eclipse will last about a minute or more. In the USSR the path of the eclipse will pass over many well-populated regions where mid-totality will occur either in the late afternoon or toward sunset. The sun will set totally eclipsed in Turkestan.

The eclipse will last about two hours and 27 minutes from the time the sun rises eclipsed in Idaho until the sun sets eclipsed.

One-half to four-fifths of the sun will be blotted out for observers in the British Isles, while in Iceland only 8% to 14% of the sun will be visible during maximum eclipse. A part or all of the sun will be covered by the moon's shadow for war workers in North America, flyers and sailors in the North Atlantic Ocean, natives in the North Polar regions and fighters, both allied and enemy, over all of Europe.

The nearer the spectator is to the path of totality, the greater will be the amount of the sun that is hidden from him. Some who are in the regions far from the axis of the shadow which lies on a direct line with the moon and the sun will see only a small portion of the sun covered. The diagram shows the southern limits of the partial eclipse, and the path the total eclipse will take.

An eclipse at any particular point can never be total for longer than seven and a half minutes, and this duration can occur only at noon near the equator. The average total eclipse lasts only about two or three minutes. Although the total phase of the July eclipse has a shorter duration (lasting about one and a quarter minutes at most) and narrower path than the average total eclipse, the path passes over much land area and gives many peoples a chance to enjoy its beauty. It fortunately occurs at a season when weather conditions are in general favorable.

Many professional and amateur astronomers here in the United States have considered the possibility of going to Canada to study the eclipse. Due to the inaccessibility of the Hudson Bay region, points on the path in other parts of Canada are the best from which to view the eclipse. Some have selected Pine River, Manitoba, as a likely place even though totality there will be brief, because of its accessibility by rail or car. The government's request that civilians do only essential traveling, however, has kept many such plans from materializing.

Great interest in the eclipse has been reported in the Scandinavian countries and the USSR. Despite war, preparations are already underway to locate a number of observation stations along its path through Norway, Sweden, Finland and Russia.

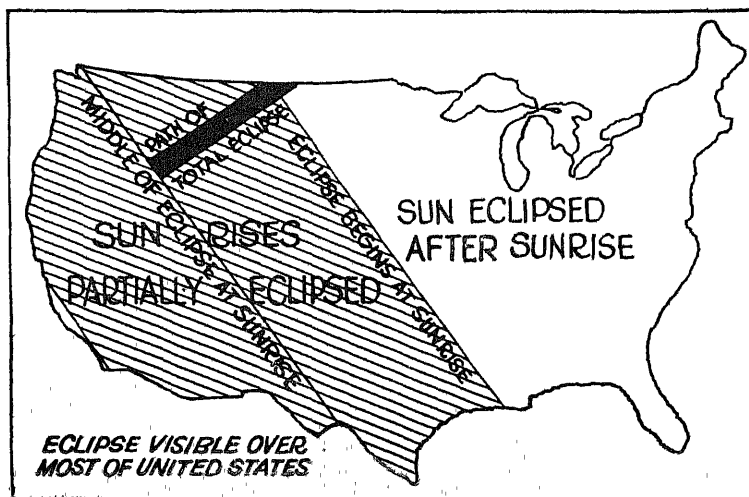
A number of problems to be investigated have been outlined by Prof. Bertil Lindblad of the Stockholm Observatory. They are largely astrophysical, dealing with the flash spectrum and the polarization of the light of the corona.

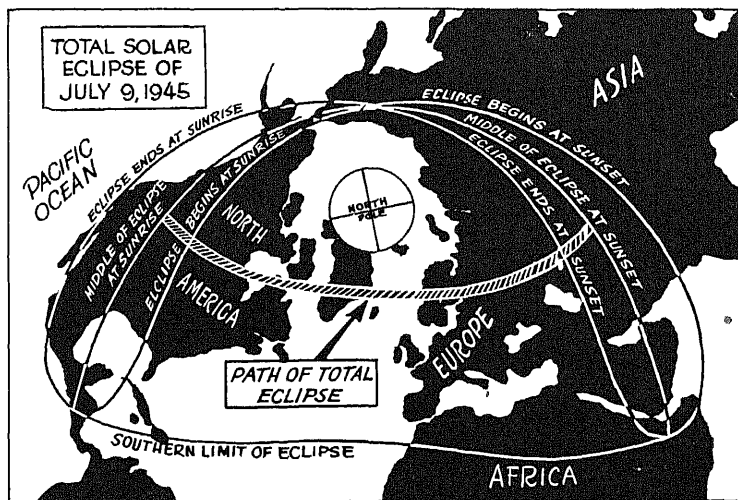
Of particular interest are plans for astronomical-geodetic work which would require international cooperation and accurate observations all along the path of totality. The coming eclipse is believed to offer an excellent opportunity to determine accurately the distance between points in Canada, Greenland and Europe.

Science News Letter, May 12, 1945

Beetles and humans have similar likes and dislikes for sweet- and sour-tasting foods.

Copper sulfate, in a concentration of 1 to 100,000 in water, will destroy typhoid and cholera germs in approximately four hours.





matter how hardened a criminal a man may be he can still feel deep in his heart the guilt of his crimes. This is so well known, that it is routine to remove from a criminal's cell all instruments with which he might kill himself.

The suicide is often just as unwilling to die as you or I would be. Men and women in hospitals suffering from the effects of poisons they have taken or wounds they have inflicted on themselves will beg their physicians to save them from death.

This apparent contradiction between the suicide's willingness to be murdered and his unwillingness to die is thought by some psychiatrists to be explained by the fact that it is impossible for all children and many adults to imagine themselves as no longer alive.

The angry child who tells his father, "You'll be sorry when I am dead," may picture the scene of his own funeral with weeping relatives and grieving friends, but always in his imagination he is there still in the midst of them, enjoying the spectacle of their discomfort. It is not possible for him to think of his own death as final and irreversible.

The most brutal war criminal may have the same childish way of thinking and may even kill himself in a spirit of revenge against the leaders that have brought him to disaster or against those who are bringing him to justice.

Science News Letter, May 12, 1945

ORDNANCE

British Bomb Travels Faster Than Sound

► NEW BRITISH rocket-propelled bombs that travel at a speed of 1,100 feet a second, greater than the speed of sound, have recently been developed, reports the British Information Service. The new bomb, dropped from a B-17 Flying Fortress, will tear through six thick layers of concrete before exploding.

Scientists of the British Admiralty, working in cooperation with the British Ministry of Supply, developed the powerful new bombs which ripped open Nazi E-boat shelters at Ijmuiden, Holland, as if they had been made of paper. The job of testing the rocket-propelled bombs was carried out by the U. S. Eighth Air Force. No further details on the design or construction of the bomb are released.

Under reverse lend-lease, details of the design of the bomb have been made available to the U. S. Army Air Forces for possible use in their operations.

Science News Letter, May 12, 1945

PSYCHIATRY

Suicide Is Murder

It is not the desire to die that makes a man commit suicide, psychiatrists tell us; it is the desire to kill turned on the self.

► IN MOST people the desire to hold on to this life is so strong that the daily reports of suicides that come to us with the war news are completely puzzling, and yet there is an explanation.

Reports of Nazi leaders killing themselves in disordered Berlin. Reports of Japanese fanatical warriors riding robot bombs to their own death. Reports of German war criminals cheating justice through suicide. Reports of Japanese officers committing hara-kiri when faced with defeat.

Such news seems fantastic and almost incredible to those who love life.

But psychiatrists have explored through psychoanalysis the minds of attempted suicides—men and women who have been restrained from suicide only by the constant vigilance of friends and nurses. They are able to explain why it is that some men are willing to kill themselves. And why it is that a man can turn the weapon he has used to kill others and use it for his own self-murder.

It is not the desire to die that makes a man commit suicide, psychiatrists tell us; it is the desire to kill. Hate makes a man kill himself just as hate sometimes makes a man want to kill his neighbor. Usually, the suicide actually wants to kill someone else but is somehow cheated of his victim.

In the case of the defeated war lord

or the war criminal facing arrest, it is easy to see how circumstances prevent the accustomed outlet of the will to kill. In the case of the many civilian suicides that are a common occurrence all around us, it is often the individual's own conscience that keeps him from killing the person he hates.

The close link between murder and suicide is revealed by statistics. Murder rates and suicide rates always have an inverse relationship to each other. As one goes up the other goes down. And suicide rates tend to be at their lowest in time of war.

Any man may at some time feel a hatred bitter enough so that he wants to strike another man down, get rid of him. But in most men, such desires are balanced and kept in check by other, more friendly emotions. We don't have to act on such an impulse. It doesn't even worry us. We push it aside even before we are aware of it, and forget it.

But the suicide cannot get rid of his desire to destroy—to kill. If he can't kill someone else, he kills himself. So, suicide is really murder directed toward the self.

But, obviously, the man who kills himself must be willing to submit to murder. This is not quite the same, psychiatrists tell us, as wanting to die. Instead, it is the need for punishment to relieve an overwhelming sense of guilt. And no

PHYSIOLOGY

Effect of Radar's Waves Studied by Army and Navy

► RADAR, the radio echo device that can pick up targets through the clouds and spot airplanes miles away, may confuse homing pigeons and cause mild headaches among men who operate the device. Studies of the effects of micro-waves and ultra-high frequency short waves upon pigeons and men are being made by Major Otto Meyer, the Army's top authority on pigeons, and Lt. Comdr. L. E. Daily, a Navy doctor.

While no evidence of physical damage has been discovered among the men who operate the Navy's radar devices, some of the men reported mild headaches and the feeling that their faces were flushed. These symptoms are reported to have ceased when they were more than four feet from the radio wave emissions of the transmitting equipment or the receiving antennae. These studies have disproved the theory that radar waves might cause baldness, and that radar emissions interfere with the ability of men to father children. Periodic physical examinations of radar operators are being continued, as is the practice of shielding the men from the radar waves.

The long waves of ordinary radio do no seem to bother pigeons, but they appear to be somewhat upset by the short radar waves. The Signal Corps is investigating the matter because officials hope the study may show why pigeons can find their way home.

Science News Letter, May 12, 1945

AERONAUTICS

Ten Men Fly in Tanks on P-38 Lightning Fighters

► FIVE MEN equals 300 gallons may sound like unusual mathematics; but five men can fit into each of two special wing tanks, each of about 300-gallon fuel capacity, and be flown for long distances underneath the wings of a P-38 Lightning fighter plane. The versatile war-planes were turned into troop and cargo transports to help solve a major combat problem encountered by the rapid American advances in the Pacific war. The task is to fly ground crews and equipment to newly captured airfields so that they can be enlarged to permit big planes to land.

The nose of the new personnel tanks is of transparent plastic, to give the occupants light and to counteract their

feeling of confinement during long hops. Structural strength to carry the weight of five men in the tanks, which are similar in size and shape to jettisonable fuel tanks, has been achieved by braces that leave the tank interiors free of obstructions. The rear section of each tank can be removed instantly, for a quick exit. Successful parachute jumps have been made from the wing tanks.

The personnel tanks are attached underneath the wings of the P-38 by the same drop shackles used for fuel tanks, bombs or torpedoes. No special attachments are necessary. Dropping a transport tank by mistake is made impossible by the installation of a safety device inside the tank. If it becomes necessary to drop the tanks in battle, the last man to bail out of the tank pulls the safety catch, which permits the pilot to jettison the empty container.

Air vents controlled from within the tank provide ample ventilation. Telephone connections permit conversation between pilot and tank occupants.

In addition to ground crews and cargo, the tanks can be used to help evacuate wounded soldiers from forward areas, and to carry paratroopers to their objectives on combat missions.

Science News Letter, May 12, 1945

ENGINEERING

Instrument Tells Pilot Of Engine Efficiency

► A NEW, but important, instrument has been added to the already confusingly crowded instrument panels of multi-engine aircraft. Known as the engine performance calculator, it merits its position because it can show the pilot or flight engineer by a glance at a plastic dial how any engine is performing. It eliminates complicated mathematical computations which, if not accurate, might result in the plane's failing to reach its destination, since the distance a multi-engine plane can fly depends largely upon the efficient operation of its engines.

Developed by H. B. Riggs, a flight engineer with Consolidated Vultee Aircraft Corporation, the calculator is set in accordance with engine speed and manifold pressure instrument indications. From this it computes such important information as fuel consumption, horsepower and cylinder pressure.

The idea for the calculator came to Mr. Riggs while he was trying to keep a malfunctioning patrol bomber engine in operation during a long flight over the Pacific.

Science News Letter, May 12, 1945



ORDNANCE

Tanks on Road in Germany Have Rocket Launchers

See Front Cover

► SOME SHERMAN M4 TANKS, like the ones shown in the photograph on the front cover of this SCIENCE NEWS LETTER, operating on roads inside Germany, are equipped with rocket launchers on top.

The rocket-launching tubes were manufactured by General Electric in a peacetime home laundry equipment plant. The tubes were mounted by other manufacturers.

Science News Letter, May 12, 1945

GENERAL SCIENCE

Bureau of Science at Manila Totally Destroyed

► SENSELESS and suicidal fury of the trapped Japanese in Manila vented itself on scientific treasures as well as on historical and religious monuments. Word has reached Prof. E. D. Merrill, head of the Harvard University botany department and director of the Arnold Arboretum, that the Philippine Bureau of Science, of which he was once director, was completely destroyed.

The Bureau of Science, which was the principal center of research work in the Philippines, housed the most important scientific library in the islands, was publishing headquarters for the Philippine *Journal of Science*, and contained thousands of specimens of Philippine and other Asian plants, birds, mammals, insects and other animal forms.

Prof. Merrill states: "In the same general area important buildings that are totally destroyed or very badly damaged include the School of Medicine, the School of Hygiene and Public Health, the entire plant of the University of the Philippines, the Philippine General Hospital, the Weather Bureau and the Philippine National Library. These buildings, for the most part of modern reinforced concrete construction, were especially designed for their specific purposes. My informant states that in short the Japanese obliterated everything of scientific value, the loss of the important libraries being particularly serious."

Science News Letter, May 12, 1945

E FIELDS

ELECTRONICS

Bomber Gunners Can Talk Without Ceasing Fire

➤ DURING critical moments in air battle a slight movement of the thumb on the gun controls of a 50-caliber machine gun aboard a Flying Fortress now permits the gunner to switch on his throat microphone and talk to other members of the crew without ceasing fire on the enemy. The new gun-mounted microphone switch can be built with existing materials aboard a standard-equipped B-17 and saves about 40 feet of rubber covered electric cable.

Developed at the Cheyenne, Wyo., modification center of United Air Lines with the cooperation of the Air Technical Service Command, the method simplifies the layout of the intercommunication system in a bomber, saving up to 21,600 man-hours a year in speeding bombers to the fighting fronts.

The new microphone switch unit eliminates the connecting jack box for the microphone cable, and all its component parts. The switch is mounted on the gun adapter and wiring is run directly to the plane's master intercommunications system. Previously, five separate junctions, including jack boxes and intricate wiring, were required on each B-17.

Science News Letter, May 12, 1945

CHEMISTRY

Fruit Juice Concentrated Without Affecting Flavor

➤ CONCENTRATED and sterilized fruit juices can be prepared by a process that does not unfavorably affect their flavors, as happens sometimes in the current practices that involve heat treatment. U. S. Patent 2,374,219 has been issued on the new process to Royal Lee, of Milwaukee.

Instead of heating the juice to get rid of excess water, Mr. Lee freezes it. This converts most of the water into ice, at the same time trapping pulp and other undesired solids. The icy mass is then crushed, and the unfrozen, concentrated juice is centrifuged out.

The inventor proposes several methods for sterilizing the juice. One of the most ingenious is the addition of germ-killing chemicals like toluene or methanol. These

are poisonous, but they never reach the consumer, for they are also volatile, and they are evaporated out by gentle warming in a vacuum pan or a spray chamber before the final product is bottled or canned. The low-temperature evaporating step may be carried to the point of preparing a solid instead of a concentrated liquid or syrupy product.

Science News Letter, May 12, 1945

CONSERVATION

Regional Development Of Great River Basins

➤ DEVELOPMENT of the nation's great river basins on a regional basis, along lines suggested by the successful experiment in the Tennessee valley, was indicated as a possible way of escape from the threatening drift towards overcentralization in government and the growth of monopoly in business, in an address by Vice-Chairman Leland Olds of the Federal Power Commission before the Washington Academy of Sciences.

Mr. Olds pointed out that although authorization for a valley development originates with the national government, the actual work is carried out within the region, by its own people, and controls are immediate and on the spot, not in the hands of a remote bureau in Washington.

Benefits of a well-worked-out regional development are manifold, the speaker stated. Flood prevention and soil conservation go hand in hand for reforestation and contour-cultivation farming are relied on even more than the dams for preserving and regulating the water supply. This land-use improvement is almost inevitably followed by a rise in the standard of living within the region, as farming becomes at once more diversified and more productive.

Cheaper freight transportation results from the formation of man-made lakes and the improvement of stream channels. This has its reflection in the encouragement of manufacturing within the valley, with raw materials drawn from regional sources and finished products going first to regional markets. Power from hydroelectric plants at the dams, combined in some of the regions with steam-generated electricity from cheaply obtained coal, gives special encouragement to small business, because current is easily carried to practically any desired spot and concentration of manufacturing plants near power sites is no longer necessary.

Science News Letter, May 12, 1945

AERONAUTICS

Sweden Develops Air Force With American Planes

➤ LEADING all Scandinavia in the development of military and civilian flying, Sweden may become one of the important nations in postwar aviation. Most of the flying these days over Sweden is being done in American-built airplanes, and the outlook for the sale of our aircraft is good for the future.

Within a short time, 50 North American P-51 Mustang fighter planes, purchased for the Swedish air force by the Riksdag (Swedish Parliament), will be in service. Most of these planes, purchased at a cost of 34,000,000 kronor (\$8,500,000) will go to the Skane wing of the air force.

Sweden's own light-airplane manufacturing company, Skandinaviska, has recently announced the development of an all-wood sports monoplane. Known as the BHT-1A, it is thrust through the air at a maximum speed of 150 miles an hour by a 62 horsepower in-line engine built by Walter Mikren. It has a wingspan of 22.4 feet and a range of 560 miles.

Operating converted Boeing B-17 Flying Fortresses, Douglas DC-3 transports, and Junkers JU-52 transports, the Swedish airline A.B. Aerotransport now operates a service between Sweden and England. Passenger fare for the hop is a little less than \$175. After the war, this airline plans to resume its prewar operations, which were suspended in 1939, by extending service from Stockholm to Riga, Velikije Luki and Moscow to the east, and from Stockholm to Malmo, Copenhagen, Amsterdam, Brussels, London and Paris to the southwest.

Science News Letter, May 12, 1945

PHYSICS

Choice of Colors in Fluorescent Lighting

➤ If you don't like the bluish-white light you get from the standard fluorescent lighting fixtures, there is a possibility of a choice of colors, in the invention on which patent 2,374,640 has been granted to Leslie R. Paul of Philadelphia. Around the fluorescent glow-tube he places a second tube, which bears longitudinal bands of various colors—is, in effect, a series of light filters. This can be turned by a remote-controlled low-speed motor, until the desired color effect is obtained; then the motor is stopped. A curved metal shield around the back of the color tube prevents undesired light-mixing.

Science News Letter, May 12, 1945

PSYCHOLOGY

Jobs for Returning G.I.'s

Servicemen are aided in selecting the best civilian job. Skill, aptitude and interest three most important considerations when choosing a permanent occupation.

By MARJORIE VAN DE WATER

➤ WHEN the serviceman has completed his share of the fighting and comes home, like the proverbial postman on a holiday his first thought is to get work to do. Even before he goes shopping for neckties and sportswear he begins to look around for a good job.

If he has been a year, or two years or more in service, he may have the disadvantage of not being in touch with people in industry or business. Jobs, industrial processes, and raw materials may have changed greatly during his long absence. If he left straight from high school, he may never have had the experience of finding and holding a job of any kind.

But he has many other advantages to outweigh these handicaps. He is free to choose the particular kind of job he would like and is fitted for—if he can find it. He is not tied down by habit or loyalty to a particular concern, or even, perhaps, to any particular town. He has had experience in service that may be of tremendous value to him in a new occupation. Chief of these advantages is very likely the freedom to choose.

Help in choosing wisely the special kind of work that will give him lasting happiness and satisfaction and a chance to grow on the job is given the returning serviceman by a group of psychologists and job experts in a new book just prepared by a committee of the National Research Council and published by the Infantry Journal-Penguin, *Psychology for the Returning Serviceman*.

Needs to Know Himself

In addition to the facts that a man looking for a job needs to know about business conditions, job opportunities, the reputation of employers, there are many things he needs to know about himself in order to pick the right kind of occupation.

There are, the specialists tell the returning serviceman, three things about any man that are especially important in matching him up with the kind of job that he would fit into well:

(1) Skill: What kinds of jobs do you

already know how to handle?

(2) Aptitude: What other kinds of jobs will you master fastest and best if you take time to get some special training?

(3) Interest: Out of the jobs you are already fitted for, or which you can readily learn, which job are you most likely to find satisfying?

On all of these points, the answer lies within you. It depends on your abilities, your experiences, your personality.

The experience of experts in job analysis of hundreds of occupations in military service and in civilian industry is ready to assist the man who wants to make use of his former civilian skills or the specialties he has learned in service. How it can help is explained in the book:

Occupations are compared with each other on the basis of five kinds of facts about each one:

(1) The operations to be performed in doing the work.

(2) Tools, machines and other aids used.

(3) Materials with which the work is carried out.

(4) Traits or special abilities required of the worker.

(5) Special hazards or working conditions.

When jobs are analyzed in this way—and many thousands of them have been—the amount of similarity in skill between one job and another begins to appear. Then it is possible to gather jobs into “families” of closely similar skills. For each family of civilian jobs there may be a specialized military job or group of them that calls for much the same kind of man with the same kind of skills.

When you yourself went into the Service, it was decided what kind of job you could best do there. You were examined for this purpose, perhaps more than once, and your special skills were put down on your record. There may not have been any need, at the time you went in, for your special abilities, and there may have been a great need for infantrymen, artillerymen, and others for whom there are no corresponding workers in civilian life. But any time the need may have come up for your special skill—it would come



POSTWAR ABILITY—Seamen will find a use for their ability to make seafaring splices when it comes time to find a permanent job back home.

WEAVING COMMUNICATION HIGHWAYS

RESEARCH

FINDS THE IDEA

DESIGN

GIVES IT FORM

DEVELOPMENT

MAKES IT WORK

SPECIFICATIONS

TELL THE FACTORY

BELL TELEPHONE LABORATORIES

brings together the efforts of 2000 specialists in telephone and radio communication. Their wartime work has produced more than 1000 projects for the Armed Forces, ranging from carrier telephone systems, packaged for the battle-front, to the electrical gun director which helped shoot down robots above the White Cliffs of Dover. In normal times, Bell Laboratories' work in the Bell System is to insure continuous improvement and economies in telephone service.



Do You Know? From Page 298

Calcium phosphate added to table salt prevents caking.

The odor of *celery* seed is apparently due to derivatives of sedanollic acid.

Copper from Canadian mines is being imported into the United States at a rate of about 10,000 tons a month.

Rainwater collected in towns contains considerably more ammonia than that which falls in the country.

Oxyhydrogen, not oxyacetylene, welding torches are used for under-water cutting and welding on sunken ships and other objects.

Sprouting tests with over 300 soybean seed stocks showed that less than 10% produced sprouts suitable for human consumption.

Three promising insecticides, developed to replace or supplement the supply of rotenone and pyrethrum, are DDT, ground Mexican sabadilla seed with lime as an activator, and an abstract from Ryania, a South American shrub.

A deadly disease of the American elm known as *phloem necrosis*, not related to the Dutch elm disease, is destroying tens of thousands of trees in the Midwest; how it spreads, and how it may be controlled, have not been discovered.

up for hundreds of thousands of men—it was right there on your record and your Service would have found you and changed you to a new job. The knowledge of what job family each man had worked in as a civilian was a useful guide.

Now this process can work in reverse. Many men have acquired new skills in the Army and Navy. Each of these specialized skills has been analyzed in relation to the job families of civilian life. As a result, any man who has had a specialized military job can find out what kinds of civilian work he is now partly or fully trained to do.

Here are some examples:

(1) The *demolition specialist* in the Engineers. His work in the Army consists of demolishing obstacles built by the enemy, roads, bridges, bunkers, dug-outs and buildings. It may not seem as though there would be much use for such skills back home after the war, when we will be busy at the work of building roads and bridges instead of blowing them up. But a careful look at just how he goes about his mission of destruction shows that he does these things: he determines the size, type and methods of placing charges of explosives; assists in drilling the necessary drill holes; attaches fuses or electric wires to the charges; and finally explodes them from a position of safety.

By looking in the lists of civilian job families, we find that a man who has learned all this is set, with very little additional training, to become a slate shooter in a bituminous coal mine. The slate shooter drills holes into the slate roof of haulage ways and charges and sets off explosives there. Or he could become a blaster in such industries as construction, logging, or wood distillation and charcoal. There his job would be to break up or loosen hard or packed materials, or to remove obstructions by blasting.

(2) The *heavy machine gunner* in the infantry. The soldier with this job doesn't merely load, aim and fire a heavy machine gun; he also learns how to strip it and how to replace worn or damaged parts. Back home in the firearms industry there is an assembler who performs essentially the same job. There won't be many assemblers of machine guns needed after the war? Maybe not. But there are a lot of jobs that call for a skill just a little different from what the heavy ma-

chine gunner has acquired. With only brief training right on the job he might readily learn to assemble—or repair—such civilian articles as typewriters, washing machines, or even amusement park devices and pinball games.

(3) The *Fire-Control Man*. Chief and First Class, analyzes and repairs a wide variety of electrically controlled instruments used in the Navy. In addition he must be able to calibrate rangefinders. With additional training in the specific types of electrical instruments involved, he can become an electrical instrument repairman who repairs and calibrates thermostats, recording gages, and relays. As an office-machine repairman, he can learn to do inspection, repair and adjustment of adding, calculating and book-keeping machines. These office machines are the same kind of mathematical wizards, on a smaller scale perhaps, as the "calculators" in battleships.

Occupational Training

The G. I. Bill of Rights makes it possible for a returning soldier or sailor to obtain the training he needs to fit him for an occupation for which he has related skills. It also makes it possible for him to select an entirely new occupation or profession and develop skills he has never previously had. In case he decides to take advantage of the latter possibility, it is then important that he have the necessary aptitude to profit from the training and the necessary interest to make him persist in the long, difficult period of study.

There are tests that can be used to help a man discover his own talents and aptitudes. Usually, these must be given and interpreted by experts, but experts are available in the local offices of USES or in Veteran Counseling Centers in various parts of the country.

There are tests of interests, too, but the best clue to your interests is the knowledge of the kinds of work that have held your interest previously. If you have always liked to work with other people, you don't want to go into a job where you will be isolated.

If you enjoy work with machines or doing things with your hands, you may not find the same satisfaction in purely mental work at a desk. If it troubles you to have to make decisions and be responsible for the work of other people, you probably (Turn to page 302)



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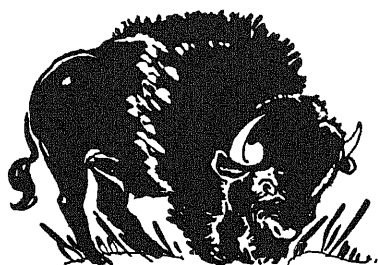
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Missing in Action

➤ **DISAPPEARANCE** of the bison we are accustomed to regard as a purely American tragedy—or as a tragedy very narrowly averted. Our grandsires slew them on the Plains by millions; our fathers saved a few scores or maybe hundreds of them; we see them now somewhat precariously on the increase.

But there is another species of bison, very similar to our own, that very few Americans ever saw or even heard of; and the last remnants of this species, native to Europe, have by now probably been wiped out, hapless victims of war.

The European bison, usually called the wisent, once ranged widely over the Continent and in adjacent parts of Asia. In the centuries just before the dawn of history it seems to have been regarded as a divine being, for the bearded, curve-horned winged human-faced bulls of ancient Mesopotamia appear to have been modeled originally on this animal.

Throughout ancient and medieval history, the wisent was a prime prize for hunters in the wilder parts of Europe. As wilderness dwindled and farmlands and cities increased, so went the wisent, until at the beginning of the present century there were only two sizable herds left. One, of somewhat over a thousand head, lived on the wooded slopes of the Caucasus mountains. The other, only about a third as numerous, was carefully kept on a wooded estate on the Baltic plain—within what were once the boundaries of Poland.

During the turbulent times that followed the first World War, the first herd utterly disappeared, and the second was cut down to a few dozen specimens. Nobody knows the story of the wisent hunts

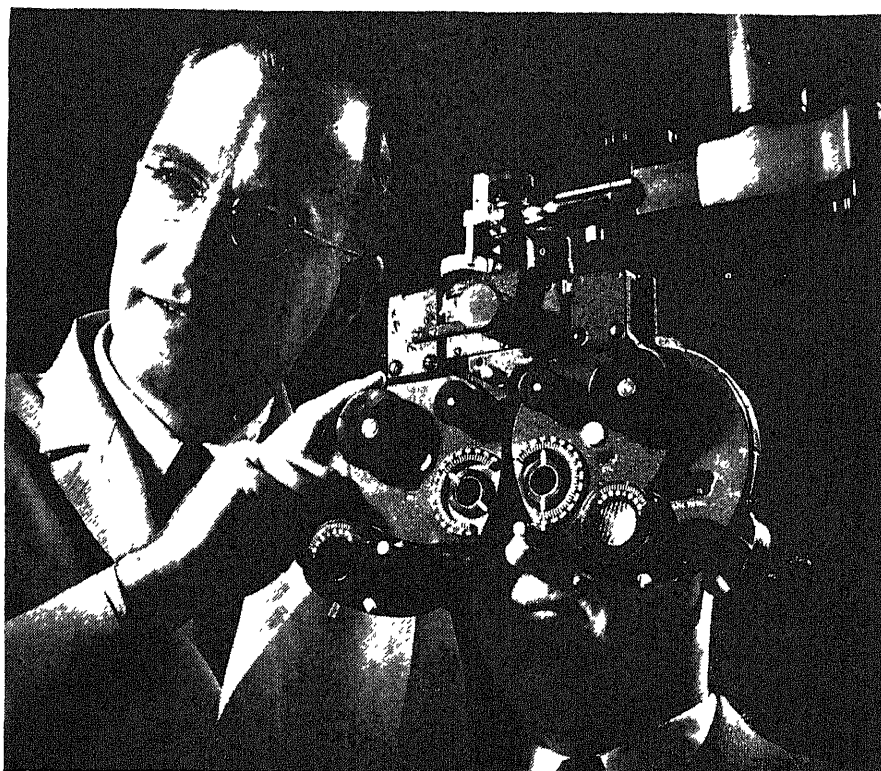
of those desperate days. Certainly, though, they were not the sport of kings and nobles; they were the meat-getting forays of hungry men with weapons in their hands. When the belly pinches hard, conservation lessons are easily forgotten.

The present war has surged back and forth over the range of the surviving herd in the northern country. Starvation tenfold worse than that of World War I has scourged the Baltic lands again and again; it would be unreasonable to expect any edible animal to be left alive in the forests there.

There were, in addition to these two herds, a few scattered specimens in European zoological gardens and in the private parks of noblemen. Attempts had been made to breed these animals, but for the most part these had not been very successful.

Probably one of the first postwar undertakings of zoologists, when there is again leisure for scholarly things, will be a census of what few wisent may be left alive. It will be a melancholy business.

Science News Letter, May 12, 1945



A Matter of Life and Death



During 1945, nearly a hundred thousand Americans will lose their lives—*victims of home-front accidents.*

Three times that many will suffer permanent disability. And the cause for many of these accidents will be faulty vision, or vision unsuited to its tasks.

You might never think of an eyesight examination as a matter of life and death. But the things you do at work, at home, on the farm, or in traffic—the hazards of everyday living—require efficient, alert eyesight. Keen vision is safe vision; reduction of accidents is a matter of national urgency.

The only way you can be sure about your

vision is to consult an ophthalmologist or optometrist for a complete visual analysis. If correction is called for, you can depend on the professional and technical skills of the optometrist or optician to provide modern attractive eyewear.

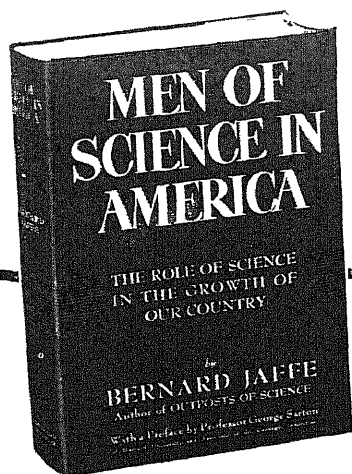
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alike"**

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—Book-of-the-Month Club News

"A pioneer in an important field. Mr. Jaffe has succeeded in stating an outline of American science and in describing its continuities and interrelationships, and is, so far as I know, the first historian who has ever done so. He has written a book which has long been needed."

—New York Herald Tribune

Professor George Sarton of Harvard has written the foreword. Contains 600 pages, 28 plates, and 25 text diagrams. Third printing. Price \$3.75

SIMON AND SCHUSTER, Publishers

CHEMISTRY

Plastic-Coated Fabrics

➤ DAINTY white gloves that may be washed under a faucet while still on the hands, and damask linen tablecloths from which spilled gravy may be wiped with a damp rag, are probabilities of the future if the fabric in the article is coated with a transparent plastic that does not materially alter its appearance or feel. This coating is now in extensive use in military fabrics but soon will be available for civilian purposes.

Application of plastics to the outer surfaces of fabrics is not new, but where employed, as in making kitchen oil cloth and rubberized raincoats, they changed the appearances and feeling of the cloth. The new method is with the use of vinyl butyral, and the invisible coating is so thin that its presence can hardly be detected.

Scientists of the Monsanto Chemical Company were assigned the job early in the war of finding materials with which to replace natural rubber for waterproofing and to extend the life of textiles. Intensive and concentrated research was begun even before the outbreak of the war closed off the nation's supply of natural rubber.

They turned to vinyl butyral, a plastic previously used almost exclusively as an interliner material in automobile safety glass. This material was available, and was quickly modified to meet textile requirements and those of rubber processing methods. It is now suitable for many uses, not only in coating fabrics, but also in the form of a free film, free in the sense that the plastic is used alone and not attached to a fabric.

Science News Letter, May 12, 1945

From Page 300

should not try to be an executive—at least not right away.

And other interests, besides your particular occupational interests, may be important in picking the job that is best for you.

You need to be sure your pay will be adequate, the specialists warn. For most men that is a very important consideration.

Yet pay is almost never the whole story. It is not even always the most important point. You can have fine pay on a job and at the same time be very unhappy in it. There are many other things you will want to ask about a job besides how much it pays—always supposing that you are lucky enough to have much choice about which job to take. Here are some of the main questions:

You will want to know about getting back and forth from work. You will be interested in what kinds of places are available for you to live in. It is important to learn whether your work is always between set hours or whether you have to work special shifts and do a great deal of overtime. The cleanliness, lighting and ventilation of the place where you work may be important to you.

You may enjoy working with women, or you may hate it; that can be very important, especially if you are likely to

have a woman as supervisor or employer. If you are sociable, you may want to know whether the particular company demands constant attention to the work, so that you will not be able to talk while you work. If you smoke, you may want to know whether smoking is permitted during work hours. If the job is in a plant that provides music during work hours, that may be something you will enjoy or dislike very much.

Health benefits, medical attention, and retirement plans are important in giving you a feeling of security. For security, some men will choose a government job even if they would otherwise have preferred private industry.

Any of these things may seem of fairly small importance at the time of taking a job. Then the kind of work and your qualifications for it, plus the amount of pay offered may seem to be the main things.

But if you hope to stay in the same place for a period of years, these other sides of the job will come to seem more and more important. They are what make a job a good job.

Science News Letter, May 12, 1945

The U. S. Mint turned out during 1944 approximately 8,000,000 coins for more than a score of friendly nations.

Books of the Week

➤ **BANDAGING CUT FINGERS** or more serious injuries will be easy for the layman who learns the art from the excellent illustrations and clear directions in **TECHNIQUE OF BANDAGING AND SPLINTING**, by Maj Arthur M. Tunick, M.C., AUS. (*Essential Books* \$3), although the author indicates that medical students and nurses also need a handbook of this type.

Science News Letter, May 12, 1945

➤ **MAKE YOUR OWN** wind tunnel, radial engine model and demonstrate ice format on an aircraft by following simple directions given in **DEMONSTRATIONS AND LABORATORY EXPERIENCES IN THE SCIENCE OF AERONAUTICS**, prepared by the Civil Aeronautics Administration and the American Council of Education (*McGraw*, \$2). For teachers and students in aeronautics, this manual gives illustrated, step by step instructions on how to perform 68 aviation demonstrations using inexpensive, simple, and easily available materials and supplies. Demonstrations cover aerodynamics, power plants, meteorology, navigation, communications and other fields.

Science News Letter, May 12, 1945

➤ **IN A TECHNICAL** book for students and engineers, **ADSORPTION**, by C. L. Mantell, a successful attempt has been made to correlate the practical, commercial, and engineering aspects of this important subject. The author had the help of a considerable number of men, including plant operators, material processors, and equipment producers (*McGraw* \$4.50).

Science News Letter, May 12, 1945

➤ **THE HOME** workshop, and how to make things for the home in wood and metal, are discussed in readable terms in **IT'S FUN TO MAKE IT YOURSELF**, edited by Stacey M. Ney. Many hundreds of illustrations and working drawings are included (*Journal of Living Publishing Corporation*, \$2.95).

Science News Letter, May 12, 1945

➤ A **VAST** amount of valuable and timely information about the thousands of islands in the Pacific is contained in the **PACIFIC ISLANDS HANDBOOK, 1944**, by R. W. Robson. It covers matters having to do with administration, anthropology, populations, his-

tory, resources, health and industries. It is an American edition of the **PACIFIC ISLANDS YEARBOOK** published in Australia from 1932 to 1942 (*Macmillan* \$4).

Science News Letter, May 12, 1945

➤ **TWO CENTURIES** of the development of the American iron industry into the steel industry, from the colonial iron furnace at Principio, Md., to the great steel mills of Wheeling, West Virginia, are interestingly reviewed in **PRINCIPIO TO WHEELING, A PAGEANT OF IRON AND STEEL**, by Earl Chapin. The well-illustrated book is intended for the layman (*Harpers* \$3).

Science News Letter, May 12, 1945

Just Off the Press

AMERICAN PLANNING AND CIVIC ANNUAL, Harlean James, ed.—*Amer. Planning and Civic Asso.*, 178 p., illus., \$3. A record of recent civic advance in the fields of planning, parks, housing, neighborhood improvement and conservation of national resources, including the addresses delivered at the Citizens Conference on Planning, held on the fortieth anniversary of the organization of the American Civic Association at St. Louis, Missouri, on June 14, 15, 16, 1944.

BIOMETRICS BULLETIN, vol. 1, no. 1—*The Biometrics Section, American Statistical Asso.*, 12 p., single copies, 60c, annual subscription, \$3. The first issue of a new magazine. Published 6 times a year.

THE CHEMISTRY OF ACETYLENE—Julius A. Nieuwland and Richard R. Vogt—*Reinhold*, 219 p., illus., \$4.

OF LIFE AND LOVE—Emil Ludwig—*Philosophical Lib., Inc.*, 208 p., \$3.

THE ROCKEFELLER FOUNDATION, a Review for 1944—Raymond B. Fosdick—*The Rockefeller Foundation*, 63 p., paper, illus., free.

SARGENTIA, no. 5, **FRAGMENTA PAPUANA (OBSERVATIONS OF A NATURALIST IN NETHERLANDS NEW GUINEA)**—H. J. Lam—*Arnold Arboretum of Harvard Univ.*, 196 p., paper, illus., \$3.

Science News Letter, May 12, 1945

SOCIOLOGY

Try, Try Again Is Sign Of Social Development

➤ **WHETHER** a person wants to try again to do something in which he has failed or prefers to repeat a task he has already done successfully may indicate his stage of social development, Dr. Saul Rosenzweig of Western State Psychiatric Hospital states. (*Journal of Genetic Psychology*, March)

Normally, children under seven years of age prefer to repeat success, while those over 11 like to have another try at things at which they have failed, pre-

sumably to vindicate themselves, Dr. Rosenzweig found. Children between these ages vary according to their individual personality.

But adults, if they are mentally ill or maladjusted also tend to prefer to repeat only those tasks in which they have already succeeded.

When Dr. Rosenzweig tested 45 soldiers with various mental disorders, he found that about one-third resembled young children in their lack of drive toward self-vindication.

The tasks used in the test were simple puzzles. The subjects were allowed to complete one but not the other puzzle, and then given the choice of which, if either, they would prefer to repeat.

Of a group of 70 normal Worcester school boys and girls, between the ages of four and 14, slightly more than half preferred the successful puzzle. The average age of those who wanted to repeat their previous successful experience was seven years. 11 was the mean age of the group who wanted to justify themselves. Some weren't interested in trying either again.

Science News Letter, May 12, 1945

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• New Machines and Gadgets •

⚙️ **HARVESTING** basket has a vertical, adjustable rod through its center with a handle at its top and pointed lower end so that it may be stuck in the ground. A thumbscrew holds the basket at any desired height. Both hands are left free to pick fruit without stooping to place it in the container.

Science News Letter, May 12, 1945

⚙️ **REVERSIBLE NECKTIE** has one design or material on one side and a different material on the other, and is worn with either side showing. The two materials are laid facing each other with the lining on top and all machined-screwed together, then turned right side out.

Science News Letter, May 12, 1945

⚙️ **FLASHLIGHTS**, which emit light when pointed slightly downward and automatically go out when pointed slightly above a horizontal position, contain a gravity-operated mercury switch. The drop of mercury in the switch breaks the circuit by flowing downward when the flashlight is tipped upward.

Science News Letter, May 12, 1945

⚙️ **NEW RUBBER CEMENT**, used for bonding metals, wood, plastics and ceramic materials to themselves or to each other, forms a strong union when applied under heat and pressure. Wood bonded to aluminum was torn off, since the bond was stronger than the wood itself.

Science News Letter, May 12, 1945



⚙️ **HOME HEATING** in postwar days may come from hot-water pipes hidden behind cast-iron baseboards to replace the ordinary wood baseboards, and painted to match the woodwork in the room. It is a type of the new radiant heating, and in tests seems satisfactory. The picture shows the so-called "radiant baseboard."

Science News Letter, May 12, 1945

⚙️ **SKETCHING** outfit, to replace the

familiar artist's easel, is a folding table with a shallow drawer to hold the needed paints and brushes, and a hinged easel that opens upward. The artist sits on the stool-high table, facing the easel, with the open drawer between his knees.

Science News Letter, May 12, 1945

⚙️ **SPOON-SHAPED** nozzle, attached to the spout of a watering can, delivers a wide-spread, fine spray to plants. One end is cylindrical to slide over the spout; the spoon part that causes the spray is about three times the width of the spout.

Science News Letter, May 12, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 258.

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Question Box

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How may completely automatic flight be possible in the future? p. 292.

BACTERIOLOGY

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What are the three most important considerations when choosing a permanent occupation? p. 298.

ORDNANCE

What is the speed of the new British rocket-propelled bomb? p. 295.

Where published sources are used they are cited.

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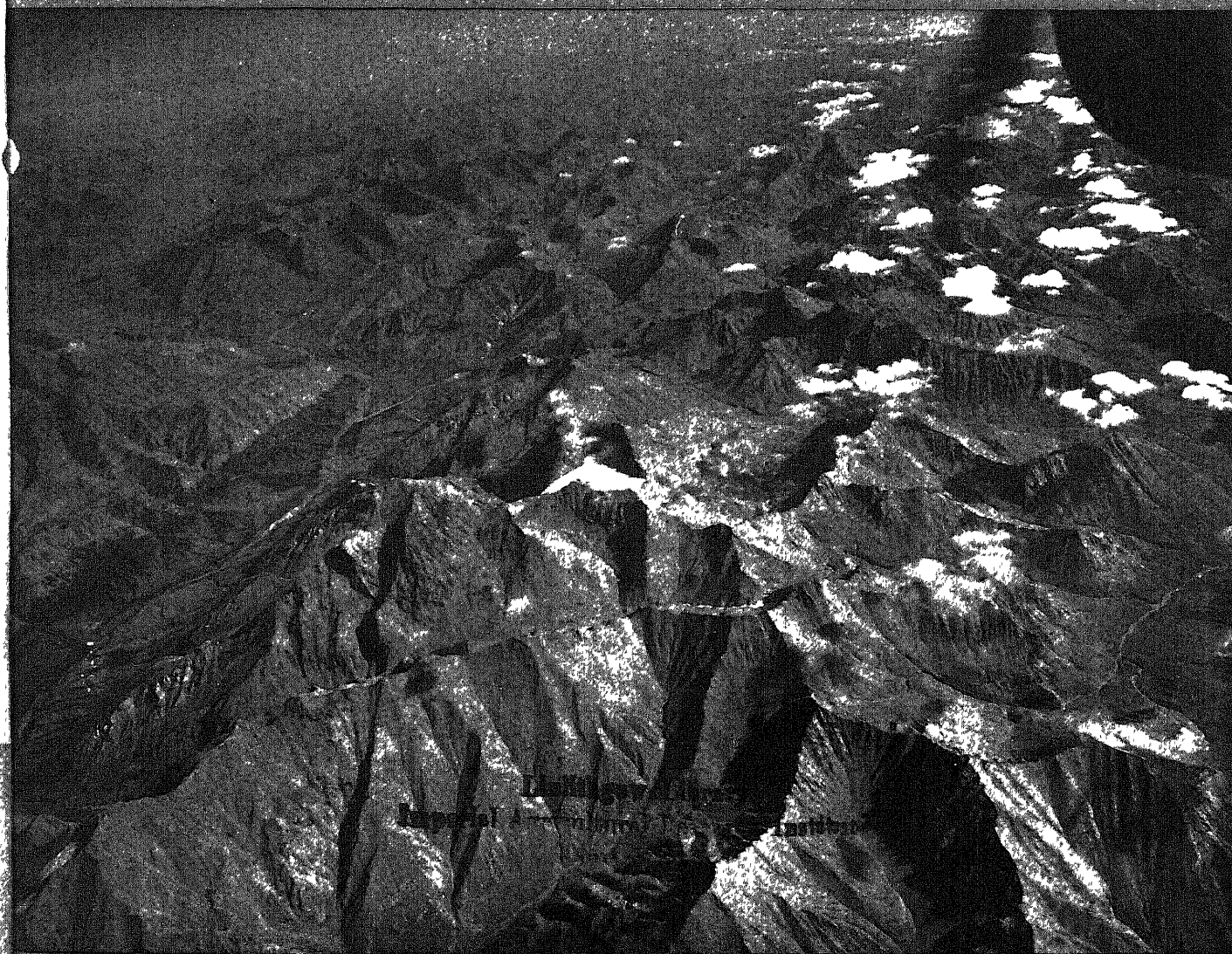
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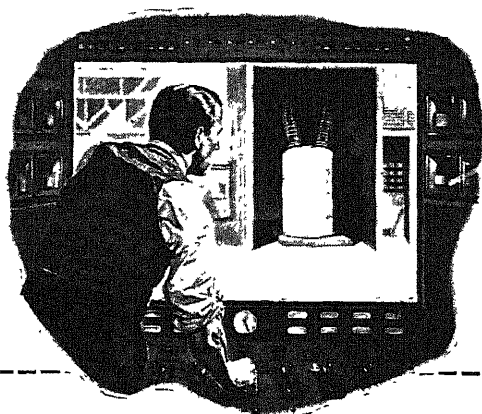
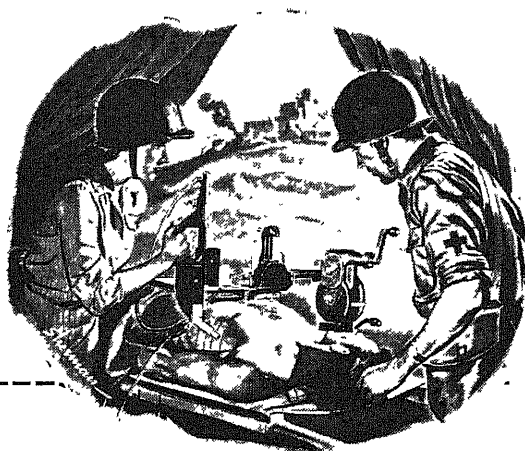
Rich Resources

See Page 311

A SCIENCE SERVICE PUBLICATION

In a field hospital, a SURGEON uses a new x-ray machine that marks the exact location of the bullet, speeds life-saving behind the battle line.

... the name on the X-RAY MACHINE is Westinghouse.



In a laboratory an ENGINEER uses the instantaneous power of 75,000 thunderbolts to test giant circuit breakers that protect America's power systems.

... the name on the CIRCUIT BREAKER is Westinghouse.

In his tent a SOLDIER uses a bug bomb to destroy insect life — safeguarding health and increasing comfort in tropical jungles.

... the name on the BUG BOMB is Westinghouse.



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Tune in: JOHN CHARLES THOMAS—Sunday 2:30 p.m. EWT, NBC

TED MALONE—Mon. Tues. Wed. Evening, Blue Network

DENTISTRY

Cavities and Polio

Exposed tooth pulp may be one route by which infantile paralysis virus enters the body. Teeth should not be pulled too near the polio season.

► CAVITIES in the teeth which expose the tooth pulp may be one route by which the infantile paralysis virus enters the body, Dr. Myron S. Aisenberg and Dr. Thomas C. Grubb, of the University of Maryland School of Dentistry, report. (*Journal, American Dental Association*, May.)

They warn, at the same time, against having teeth pulled "too near" the infantile paralysis season, since this might open an invasion route for the polio virus. They report six cases in which the disease started 5 to 10 days after having teeth pulled.

The pulp of a tooth, the scientists point out, is richly supplied with nerves arising from the fifth cranial nerve. It is reasonable to believe that the polio virus could travel this route to the brain and spinal cord.

To test this theory, they exposed the pulps of the front teeth of five rhesus monkeys, using an anesthetic to deaden the pain of the grinding. Infantile paralysis virus was carefully dropped into the cavity after bleeding had stopped. One of these monkeys developed paralysis while the others developed the non-paralytic form of the disease.

Finding that infantile paralysis could invade by this route, the scientists next examined the teeth of several hundred children in North Carolina and Baltimore during last summer's polio epidemic. In North Carolina, 69.85% of the children who had polio also had exposed tooth pulps, whereas in the group who did not get the disease, only 26.92% had exposed pulps.

In Baltimore, the figures were 65.04% of children with polio having exposed pulps and 24.07% of those without polio. Some young adults were included in the examinations but as far as practical the scientists tried to compare children in the same age groups.

Dr. Aisenberg and Dr. Grubb do not think exposed tooth pulp and sockets of recently pulled teeth are the only routes by which the polio virus enters the body. They do suggest, however, that a large scale field study will show whether this is one route.

For such a study, they advise careful examination and treatment of the teeth of all susceptible children in a given area several months before the polio season. As a control, the teeth of children in another area should be examined and records made of all pulpal exposure but no treatment given.

"If such a study were conducted over several years," they state, "the importance of pulpal exposure as a portal of entry could be evaluated."

Science News Letter, May 19, 1945

PUBLIC HEALTH

Fly-Fouled Food Seen as One Way Polio May Spread

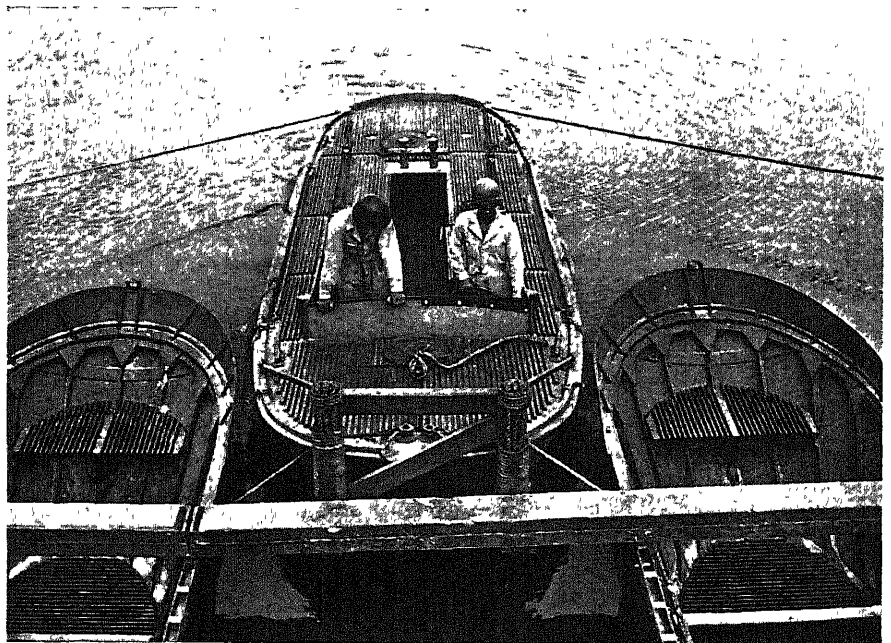
► EATING FOOD contaminated by flies may be one way of getting infantile paralysis, it appears from studies reported by Dr. Robert Ward, Dr. Joseph L. Melnick and Dr. Dorothy M. Horst-

mann, of Yale University School of Medicine. (*Science*, May 11.)

During last summer's epidemic in North Carolina, these scientists put plates of food and fly bait on back porches and yards of the homes of 16 polio patients. This was done within a week of the time the patients got sick. The food and fly bait were left exposed to any flies in the vicinity for 24 to 48 hours.

The fly-contaminated food was then fed to two chimpanzees. Tests showed these animals were not previously infected with infantile paralysis virus. After they had eaten the fly-contaminated food, the virus was found in the chimpanzees' excreta. Although the chimpanzees did not get sick, the virus from their bodies caused typical infantile paralysis injury to the brains and spinal cords of monkeys into which it was injected.

The studies, the scientists state, give additional evidence to support a working theory of the spread of infantile paralysis. According to this theory, the disease may be spread by a number of different routes. Although it may occur at any time of the year, the tremendous concentration of cases during the warm season is the result of increased distribution of the virus. This may depend on



UTILITY POWER BOAT—This new boat, capable of propelling bridge-rafts or ferries with loads up to 80 tons in swift currents, is now being shipped overseas. Each of its two propellers is driven by a gasoline engine capable of developing 80 horse-power at 3,000 revolutions per minute. The maximum pulling power is 4,000 pounds and the top speed is 15 miles per hour. Official U. S. Army photograph.

various factors, including something which makes it easy for insects such as flies to contaminate food. Flies have previously been shown to carry the virus and, in this experiment, to contaminate food with it.

PUBLIC HEALTH

Epidemics Facing Europe

Poor food supply, such as now exists in parts of Europe, causes infectious diseases to be more dangerous and deadly than when food is plentiful.

➤ **WARNING** that epidemics have always been bred by wars, Dr. Russell M. Wilder of Mayor Clinic, speaking at the University of North Carolina research conference, declared that poor food supply such as now exists in some parts of war-torn Europe causes infectious diseases to be much more dangerous and deadly than when the population has plenty of food.

"Malaria became so virulent in Greece when the people there were subjected to the starvation occasioned by the German invasion that mortality was terrifying," he recalled. "Malaria spread farther north into Eastern Europe than it ever had before in recent years, as if the soil were fertilized by the misery of the populations of Bulgaria, Rumania and the Russian lands beyond."

More scientific research is needed, he told the conference, on the part that nutrition plays in the resistance of the human body to invasion by the germs of infectious diseases.

The process of getting old and the nature of degenerative diseases now taking heavy human toll may be explained by research on the nature of alterations in the enzymatic systems of the body on which the life of cells and tissues is dependent, he declared. A number of chronic diseases, hitherto of unknown cause, have been reproduced experimentally with diets restricted as to certain vitamins and amino acids.

"Although scientific progress in the science of nutrition was rapid in the period between the two world wars," Dr. Wilder said, "the specialists in the field were far from ready with the answers to the questions that arose with the outbreak of this war. War calls for instant action and demands the best you have to give, no matter how inadequate that may be. The information put to work, although leaving much to be desired,

A further step in testing this theory, the scientists state, will be to conduct a controlled experimental study on the effect of reducing the number of flies during infantile paralysis epidemics.

Science News Letter, May 19, 1945

proved to be of great importance. England's general health, measured by the proportion of infants dying in their first year, became steadily worse in the first World War; in this war it has become steadily better. We also are aware of the difference in the capacity of Germany to resist invasion. The collapse of Germany at the end of World War I was due primarily to lack of the right kind of food whereas, by putting into practice what was known about nutrition, the German people in this war have not suffered from nutritional deficiencies. Indeed, in this war they have used the science of nutrition as a weapon of offense. By purposely depriving prisoners and subject populations of the foods they needed they reduced their power of resistance."

"Planning for the future must include programs of research to improve the nutritive quality of foods," Dr. Wilder said.

"Nothing seems more certain," he continued, "than that eating refined staples in the amounts in which they contribute to most diets—white flour, white rice, white hominy, white sugar—all of them starchy or sugary foods deprived by refinement of varying large proportions of their vitamins and salts, dilutes the dietary to a dangerous extent. We need more knowledge of how best to make these staple foods more wholesome. The answers reached so far are by no means satisfactory. In England undermilled wheat, retaining vitamins and minerals, was made mandatory for the war, but large numbers of people do not like such flour and it is very doubtful whether flour which is undermilled can ever compete in baking qualities with fine white flour.

"Effective efforts have been made in our country to improve white bread and flour by restoring to them the riboflavin,

thiamin, niacin and iron removed in milling. The products thus obtained encounter no objection on the part of the consumer but fail to satisfy the critics who demand that nothing be removed from wheat by milling. Here is room for more research by biochemists, nutritionists and food industrialists. Effort must continue until flour and other staples are obtained which are acceptable to the consumer but which also possess all of the nutritionally important constituents of the grains from which they are derived."

Science News Letter, May 19, 1945

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ASTRONOMY

Supernova Discovered

Located in the constellation of Canes Venatici, or the Hunting Dogs, near the Big Dipper, the new star is the result of a chance observation.

► CHANCE PLAYED a role, as it often does in scientific research, in the discovery of a supernova in the constellation of Canes Venatici, or the Hunting Dogs, near the Big Dipper, at Mount Wilson Observatory in Pasadena, Calif.

Discovery of a supernova—a star which temporarily may become 100 million times as bright as the sun—is always news to astronomers. But in this case, the story behind the news is as interesting as the discovery itself.

On the evening of April 6, Milton L. Humason was preparing to photograph the spectrum of the spiral nebula Messier 51 with the 100-inch telescope of the Mt. Wilson Observatory. The spiral known as Messier 51 consists of two parts: a main spiral to which is attached a small satellite. It was this satellite spiral which Mr. Humason intended to photograph.

Although he had not observed this particular nebula for three years, his attention was immediately attracted to a faint star near the central nucleus which he could not recall having seen before. At first he was inclined to dismiss the object, believing his memory was at fault. Yet somehow he felt sure there was no star at that position three years ago. If so, it was probably a supernova. The conviction became so strong that he determined to make a check at the earliest opportunity. Sure enough—examination next morning of old photographs of Messier 51 failed to reveal a star near the center of the satellite spiral.

The surest way to decide if the star was really a supernova or not would be from its spectrum. Upon the following night therefore Mr. Humason secured a photograph which told the whole story. The star was found to have strong bands in the red region of its spectrum typical of supernovae about 65 days past their maximum brilliancy.

"It was certainly fortunate that I had Messier 51 down on my observing program for the night of April 6," Humason said. "For it was fading so rapidly that I would probably have overlooked it a few weeks later. The fact that a supernova appears in a spiral nebula only once in about every 400 years makes the

coincidence seem all the more remarkable. Also, if the star had not been so close to the central nucleus I feel sure I would never have noticed it."

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METALLURGY

Distillation Purifies Metals Easily and Safely

► A SAFER method for preparing the metals calcium, strontium and barium in pure form is the subject of a group of patents, Nos. 2,375,198 to 2,375,201, inclusive, issued to Dr. Peter P. Alexander of Marblehead, Mass., president of the firm of Metal Hydrides, Inc., to which he has assigned his rights.

Most frequent impurities in these light metals are the still lighter metals, sodium and potassium. These can be driven out by heating in a closed vessel, at a temperature high enough to evaporate sodium and potassium but not the other metals. The evaporated metals are then condensed and removed.

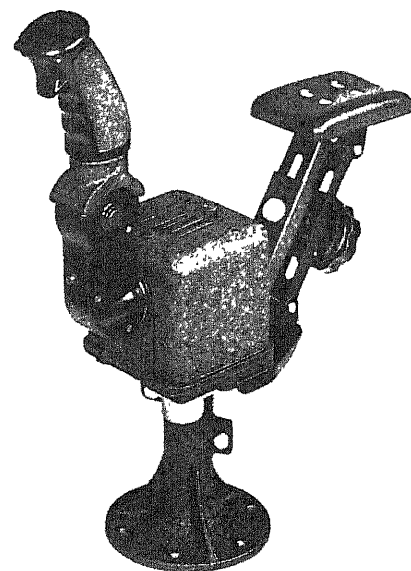
A difficulty has been that as soon as the processing vessel is opened, the highly inflammable sodium and potassium are apt to ignite on contact with the oxygen of the air. Dr. Alexander's new process obviates this by placing titanium oxide in the container where the two trouble-making metals condense. The sodium and potassium take up some of the oxygen from the titanium compound, so that by the time the air strikes them they are already oxidized and therefore safe against ignition.

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AERONAUTICS

One-Handed Flying Is Now Made Possible

► ONE-ARMED drivers who fly can now take to the sky, and safely too, with an electronic control stick that requires only one hand to manage a heavy four-engine bomber like a B-24 Liberator or B-29 Superfortress. With the aid of electronic amplification and the servo motors which control ailerons, rudder, and other movable airplane surfaces, the new con-



ONE-HAND CONTROL—This new control is used on all present heavy bombardment planes. The position of the stick and arm rest is readily seen to be arranged to give comfort to the pilot.

trol stick moves the airplane in the same direction as the stick itself is moved with little effort on the part of the pilot.

Actually less effort is required to control a heavy bomber with the new device than a boy uses in turning his bicycle. Called the formation stick, it was developed by the Air Technical Service Command and the Minneapolis-Honeywell Regulator Company. The control is a pistol-grip lever about 10 inches long, mounted with an arm rest beside the pilot. It is free to move in all directions in exactly the same manner as the "joy stick" of smaller planes.

Designed primarily to overcome pilot fatigue on long flights which are often tiring to pilots, the formation stick enables our flyers to be more alert during bombing missions, resulting in better bombing patterns and wing-tip to wing-tip flying formations, which enable our bombers to bring more guns to bear on attacking enemy aircraft. The new device also simplifies the movement of the plane in evasive action to avoid anti-aircraft fire, when pilots have to change the direction of their planes frequently.

Science News Letter, May 19, 1945

L-ascorbic acid, a chemical known as an anti-oxidant, will prevent the flesh of peaches from turning dark in drying or freezing for preservation.

GENETICS

Heredity and Emotions

Dogs that have been bred to produce pure strains will be studied in the hope of finding the effect of environment on inherited traits.

By ROBERT C. COOK

Editor, Journal of Heredity

► THE INFLUENCE of heredity on the emotion and intelligence in dogs will be studied in a quarter million dollar research project financed by the Rockefeller Foundation in the hope of learning more about human beings as they are born and the way they grow up.

The Rockefeller Foundation grant of \$282,000 to the Roscoe B. Jackson Memorial Laboratory, is for the study of "the genetic factors in intelligence and emotion in mammals." The main reason for using dogs in the early part of the project, Dr. C. C. Little, director of the laboratory, explained, is that genetic experiments require pure strains differing as much as possible in the characteristics it is proposed to study. The production of such pure strains from a mixed population is a long and tedious process.

Dog breeders have already done much of the preliminary work, and we have breeds differing not only in size and shape but in affection, pugnacity, intelligence and other mental and emotional characteristics. For most of these, the dog breeds are not as uniform as they are for conformation and color.

With respect to some traits, such as trailing capacity of blood hounds or the pointing characteristics in pointers, the breeds are already highly uniform. By selection of outstanding strains within such breeds and by crossing with other breeds which never show these characteristics, it will be possible to undertake genetic experiments which could be done in no other species of mammal without generations of selective breeding to produce pure strains.

Parallel with such research in pure genetics, it is proposed to explore the extent to which the behavior of dog breeds is the result of each generation's being brought up in a particular "dog society." Thus young pointers are nursed and reared by a mother who is herself a pointer.

What would happen if pointer pups were raised by chows? Or even what

would happen if a very young pointer embryo were transplanted into the uterus of a chow foster mother and grew up from the start in a chow environment both before and after birth? Nobody knows. Furthermore, nobody knows what would happen to a puppy if it were raised entirely separated from other dogs. Since the matured trait such as intelligence or emotional expression is always the resultant of genetic and environmental influences cooperating during growth and development, a complete understanding of such traits can only be achieved by a research approach which considers all aspects of the problem.

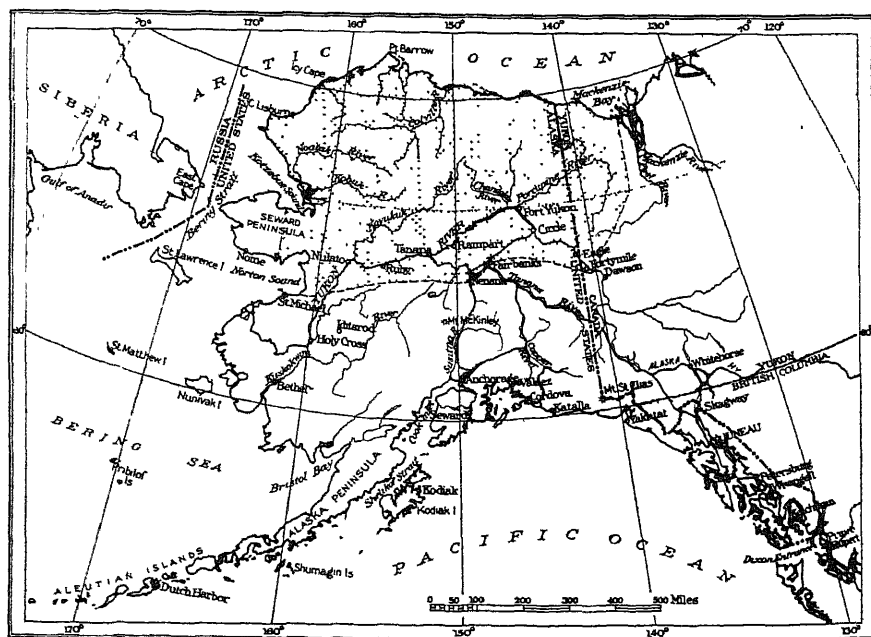
Dr. Little pointed out that for a purely genetic approach to the problems of inheritance of emotion and intelligence, neither monkeys nor apes would be of much use until generations of selective

breeding had been undertaken to produce uniform strains for crossing.

For several important characteristics, he said, such as affection, cooperation, and persistence, dogs much more closely resemble human beings than do monkeys.

It is practically impossible for an ape to persist in a specific project for any length of time. Dogs will spend hours digging for a rat. Instances are on record where pointers and setters have "frozen" in their characteristic positions when game has been flushed, and have maintained this posture until they literally froze to death. To produce strains of apes exhibiting such a single-minded persistence would be an enormously difficult undertaking requiring many years.

It is also proposed to use other mammals in the investigation. Among the highly inbred strains of mice which the Jackson Laboratory has produced for use in cancer research, definite differences in intelligence and emotional traits have been noted. Some experimentation has been begun to discover how much these differences can be modified by changing the environment. The extent to which a pugnacious strain can be turned to pacifists by various kinds of training has



VIRGIN RESOURCES—Maps of northern Alaska, made by the Geological Survey for the Army Air Forces, reveal in detail an area believed to be rich in resources. The new maps, which will not be released to the public until after the war, will cover a total of approximately 292,000 square miles, or as much territory as the combined areas of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia and Tennessee.



WESTERN ALASKA—The village of Tuliksak, situated on the Kuskokwim river, is typical of native settlements in the interior of the Territory. The Kuskokwim is the second largest river in Alaska.

been under investigation by Dr. J. P. Scott.

Further studies along this line will be undertaken, and guinea pigs, rabbits, and hamsters will also be utilized in connection with various phases of the problem.

The Hamilton farm will be used as headquarters for this project. This is a 58-acre estate recently given to the Lab-

oratory and located just outside Bar Harbor, Maine. It has barns, shacks and farm buildings which can be easily converted to serve excellently for this purpose.

It is planned to enlist the cooperation of farmers in the vicinity to rear the dogs bred in connection with the experiment. This method has been widely used by British dog breeders and will greatly reduce the expense of breeding operations.

Science News Letter, May 19, 1945

GEOLOGY

Untapped Resources

See Front Cover

➤ ALASKA IS in the limelight as a vast storehouse of essential minerals, as yet undeveloped, as a result of wartime investigations made by the U. S. Geological Survey and the U. S. Bureau of Mines. Ground explorations were made and photographs, like the one on the front cover of this SCIENCE NEWS LETTER, were taken from airplanes over great stretches of country until now little known.

This American territory, one-fifth the size of the United States proper, is already well-known for its gold and copper production but it has produced other

minerals, both metallic and non-metallic, which have contributed largely in the war. Since Alaska has been an American possession, the total mineral production has a value of approximately \$900,000,000, of which gold accounts for about 70% and copper for about 35%. The other commercial minerals mined include silver, tin, tungsten, lead, chromium, platinum metals, antimony and mercury.

Considerable quantities of other minerals that have not yet been brought into widespread commercial production include iron, nickel, zinc, molybdenum and bismuth. Asbestos, barite, garnet, graphite and sulfur are among the available non-metals.

The lack of transportation has focused mining in Alaska on the production of minerals, such as gold, that have high unit values in comparison with their weights. In postwar days, with improvements in transportation and the introduction of mechanized mining, heavy commodities of lower unit values will be produced. An expected development in hydroelectrical energy will prove of great assistance in this heavy mining.

The aerial photographs taken by the government cover nearly 300,000 square miles of territory. They reveal topographical features and geological structures of value to mineral prospectors, and the terrain through which transportation routes would have to be provided.

Science News Letter, May 19, 1945

MEDICINE

More Doctors in 1944, But Fewer for Civilians

➤ THE NUMBER of physicians in the United States increased by 3,306 in 1944, the American Medical Association has reported. Many more than this number, however, were added to the armed forces as medical officers during the year, so there was a decrease in 1944 of the number of doctors available to civilians.

There were 6,933 additions to the medical profession in 1944. These were the men and women who in that year received their first license to practice medicine and surgery. During the same year 3,627 physicians died.

Considerably higher additions to the medical profession might have been expected because of the accelerated program for medical education during the war.

"While two classes were graduated from most medical schools in 1943," the medical association explains, "the number of physicians added to the profession in that year did not increase, since many physicians who obtained M.D. degrees in December of that year were not able to receive licenses until early in the year 1944, owing to administrative details. In 1944 the number in this group was 979 more than in the previous year."

Pennsylvania gained the greatest additional number of doctors of any state. The number added was 821. New York and Ohio added more than 600 and California and Missouri more than 300. No one was added to the number of doctors in Nevada, New Mexico or Wyoming.

Science News Letter, May 19, 1945

AERONAUTICS

Catapult Seat Drops Pilot Through Floor

➤ NEWEST escape device for fighter pilots to be used in case of serious emergency is a catapult seat that drops the pilot through the floor of his plane when he presses a release lever and depresses a treadle bar with his feet. Designed for use with pusher-type planes where the propeller is located behind the cockpit instead of in front, the catapult seat throws a pilot clear of the airplane so that he will not be injured by the propeller. Pilots do not relish the idea of passing through the fast-rotating blades of a propeller in the process of bailing out.

Developed by engineers of the Consolidated Vultee Aircraft Corporation, the catapult is also a miniature elevator, for non-emergency use. On the ground it can be extended beneath the fuselage or cockpit nacelle of the aircraft. When the pilot sits down and pulls a lever, it will smoothly rise into the airplane cockpit. This will make it possible to save space in aircraft that is now needed to give the pilot an entrance to his plane. After a flight, the pilot adjusts the seat lever and lowers himself to the ground.

This new development may lead to wider experimentation with pusher type airplanes. Aeronautical engineers have long known that pusher-type airplanes can be extremely efficient, due to the fact that the most vital wing contours are not disturbed when engines and propellers are situated behind the wing surfaces.

Science News Letter, May 19, 1945

METEOROLOGY-AERONAUTICS

Aviation Weather Maps Will Be Standardized

➤ AFTER JULY 1, weather maps for aviation will be the same all over the world, when the United States Weather Bureau replaces the presently used constant-level charts with constant-pressure upper-air charts as a basis for its domestic aero weather forecasts, reports *American Aviation*. (Apr. 15)

The constant-pressure charts were developed through the combined efforts of the Army, Navy and Weather Bureau for world-wide combat and transport operations. Since the armed forces are using the constant-pressure charts, the Weather Bureau decided to adopt this type of chart for domestic forecast, in the belief that it will coordinate the continuity of

weather maps over the world and increase the efficiency of upper air analysis.

The domestic airlines, through the Meteorological Committee of the Air Transport Association, have opposed the move on the basis that airline operations in this country are accustomed to the use of the current type of chart. Therefore, the Weather Bureau will continue to report the constant-level types of charts on its teletype system for spot weather reporting until next year. This should give the airlines sufficient time to adapt to the new methods.

Science News Letter, May 19, 1945

AERONAUTICS

Tiny Detector Warns Pilot of Engine Trouble

➤ A NEW pocket-size detector tips off pilots of giant multi-engined airplanes that engine trouble is developing before it happens, thus enabling them to adjust engine controls and feather propellers before an accident occurs.

The instrument is called an engine performance indicator, and was developed by William Ehlers and Lawrence Bordolon, engineers of the Consolidated-Vultee Aircraft Corporation. It consists of an electric brain installed adjacent to the carburetor. In operation it measures the distance to right or left to which the engine is displaced when the propeller is spinning.

When the engine is operating properly, the instrument actuates a gauge in the pilot's control panel, indicating how much horsepower the engine is putting out. It is believed that it gives more accurate power information than any other device now in use.

Should a malfunction develop in the engine, the device transmits the information to the cockpit where a warning light flashes on, giving the pilot the extra time he needs to cut the engine and feather the propeller. If this were not done, the engine might tear itself to pieces or catch fire. A propeller that is not biting into the air, but just turning around, is often the result of improper engine operation, creating excessive drag forces and making the airplane difficult to operate.

Although still in the experimental stage, the instrument has proven so successful on multi-engined airplanes that plans are under way to produce it commercially for all aircraft manufacturers. The detector will be turned out by the Communications Equipment Corporation, Pasadena, Calif.

Science News Letter, May 19, 1945

IN SCIENCE

ASTROPHYSICS

Fifteenth Radiation Cycle Discovered by Dr. Abbot

➤ A HITHERTO unnoticed periodicity in the amount of heat and light given off by the sun, of 16 months' duration, has been discovered by Dr. Charles G. Abbot, recently retired as secretary of the Smithsonian Institution, and is announced in *Science*, (May 11). It adds a fifteenth radiation cycle to the 14 previously known and studied by Dr. Abbot.

The 16-month periodicity was first noticed when Dr. Abbot was re-calculating some of the solar radiation data accumulated during many years of observations. When plotted as a curve, they produced a sawtooth pattern of great regularity. At first it appeared that they might represent a 15-month interval, but an attempt to work them out on this basis failed to produce a "fit". Then the 16-month interval was tried, and was found to fall into the pattern very nicely.

In the same communication, Dr. Abbot suggests a possible physical mechanism that would account for the apparent connection between relatively small variations in solar radiation and marked changes in the earth's weather. The sun, he points out, bombards the earth and probably all space with great, machine-gun-like bursts of electrical particles, or ions.

"Electric charges," he continues, "as well known for nearly a century, act as centers for the agglomeration of dust and water particles. Thus increased solar activity in the nature of ionic discharges tends to increase haze and cloudiness in the earth's atmosphere. Such obstructions would absorb solar radiation. Thus the atmosphere would be heated when solar bombardments increase. Other meteorological consequences would naturally follow.

"Again, it may be that 11.3-year periodic fluctuations of the sun's extreme ultraviolet radiation, cut off by ozone in the upper atmosphere, may be many times 1/10 per cent. In such ways the sunspot cycle, and its details of sunspot variation, might have meteorological importance, without being associated with considerable fluctuations of the sun's total output of wave radiation."

Science News Letter, May 19, 1945

E FIELDS

CHEMISTRY

Drinking Water Sterilized By Improved Process

► WATER for drinking purposes is sterilized, to destroy micro-organisms and free it of all biological contaminations, by a treatment, recently patented, in which it first is subjected to positive pressure and moderate heat, and then injected into a high vacuum. The patent was granted to James A. Camelford, who has assigned it to the Buckeye Laboratories Corporation.

In the process, the contaminated water is strained or filtered to remove solid impurities, and then passed through a high-pressure pump which puts a pressure of from 1,000 to 4,000 pounds per square inch on it. It is heated to about 125 degrees Fahrenheit, then sprayed through a nozzle into a vessel maintained at as nearly a perfect vacuum as possible. The result is a palatable water relatively free of biological contaminations.

Science News Letter, May 19, 1945

PSYCHOLOGY

Children Only Slightly Affected by War Movies

► PICTURES in daily newspapers of starving children or bodies piled up like cordwood and newsreels of bloody battles have not made war part of the daily lives of elementary school children in Sioux City, Iowa, or even of their teachers.

When 536 elementary school children were asked to write a story suggested by such pictures as a gaunt man with clenched hands standing among gravestones or scenes of grief showing a revolver, a rifle or a rope, only about four children in every ten thought of war, Dr. A. L. Rautman and Edna Brower of the Sioux City Public Schools report. (*Journal of Psychology*, April)

Teachers gave only one picture in ten a war interpretation. Only about six stories in every hundred written by the children dealt with war.

The few children who gave a war theme to four or more of the 10 pictures of the test series were found to be in need of special guidance. In fact, the test

is believed to be an aid in detecting these children quickly and efficiently.

The number of stories dealing with war tended to increase with the greater age and higher grade of the children, although the difference was not particularly large. This slight increase may be due to the fact that older children have had more contact with information relating to wartime conditions, the psychologists believe.

About the same proportion of stories were built around the themes of death and killing as around war.

Only 35.19% of the 5,360 stories had a happy ending, contradicting the once-popular idea that childhood is a period of pure joy and freedom from worry. The younger children gave fewer of their stories a happy ending than the older ones.

Science News Letter, May 19, 1945

AGRICULTURE

Planes Sow Mustard Seed To Prevent Soil Erosion

► THE MUSTARD seed that once made the favorite poultice to relieve a cold in the chest, and is ground to dress hot dogs, is the same kind of seed now scattered by airplanes over fire-devastated mountainous areas in California to start a quick growth to form a cover to prevent soil erosion. Of a hundred kinds of seeds tested for this purpose, black mustard proved most desirable.

A report relative to the use of mustard seed to prevent erosion on burned-over areas in California has been issued by the U. S. Department of Agriculture. Erosion of many of the California hill and mountain soils is extremely severe if the chaparral or forest cover is destroyed by fire, the report states. The problem is to restore growing plants to cover the soil with their leaves and hold it with their roots before rain can get in the soil and wash it away.

The black mustard seed is satisfactory because it is light and fine, and smooth so that it settles rapidly and evenly when blown from a plane. It sprouts quickly with even slight moisture, and roots rapidly. Its first growth is a rosette of leaves that forms a protective pad at the soil surface. It is an annual that reseeds well, but dies the first year and forms a litter of dead tops. It heals the scars of the burn, but is not so persistent and permanent that it competes for long with the plants natural in chaparral and forest cover.

Science News Letter, May 19, 1945

ZOOLOGY

Weight of Salamander Increased Almost 40%

► A SALAMANDER can increase its weight by nearly 40% within a few hours just by absorbing water through its skin.

An adult salamander, excavated last fall from a shady canyon in the Santa Monica Mountains, was found to be quite dehydrated. After being weighed, the salamander was placed in a pint jar with several moist paper towels on the bottom. Twenty hours later the animal had become quite bloated, its skin smooth and taut.

Since the damp paper towels did not provide water for drinking, it was apparently absorbed through the skin, Robert C. Stebbins of the University of California at Los Angeles reports in *Copeia*, official publication of the American Society of Ichthyologists and Herpetologists. Most of the water was absorbed during the first few hours.

Mr. Stebbins doubts if terrestrial salamanders ever drink, in the sense of swallowing water, since those that have been closely observed have never been seen to take water although they have had ample opportunity to do so.

Science News Letter, May 19, 1945

BOTANY-CHEMISTRY

Many Uses for Seaweed Preparation Now Offered

► SEAWEED, put to a thousand uses by our enemies, the Japs, is offered honorable employment in many American industries through a product on which patent 2,375,259 has been granted to G. W. Stoye of Wollaston, Mass. The seaweeds used belong to the group known collectively as Irish moss, or carrageen, already known as the source of a vegetable gelatin having some food and medicinal uses. It is one of the smaller, more delicately built types of marine algae, not to be confused with the big, coarse kinds known as kelps.

Instead of the prolonged boiling used in preparing the gelatin-like product, Mr. Stoye's process involves a very short period at the boiling point, followed by continued heating at a lower temperature, and final clearing by centrifugation. The resulting product is a viscous, easily soluble colloid which the inventor states has high value in making rubber cement, paints, inks, dyes and many other materials.

Science News Letter, May 19, 1945

ENGINEERING

Speed With Safety

Cleaner, more restful rides are promised for postwar traveling. New types of day and overnight coaches, new sleepers and recreation cars have been designed.

By A. C. MONAHAN

► **SPEED** with safety, together with comfort and cleanliness for passengers, are promised for the railways of the future. Radar and radio communications, electric devices which automatically contribute to safety, new principles of combustion, gas and steam turbine engines, light metal-alloy bodies—all will help improve postwar railway traffic.

Passenger trains of the future will be streamlined from front to rear, including the locomotive—from which, incidentally, the familiar smokestack will vanish. Telescoping vestibules between the cars will make the train look like one single long unit. From the scientific standpoint the great gain is in decreased air resistance to speed. For the passenger, these vestibules will make the trip from one car to another more agreeable.

The bodies of these cars will be constructed of alloys of light metal, aluminum and magnesium, as will also the boxes of freight cars, which will enable engines to pull longer trains. These sturdy alloys have strength, and will protect the passengers in case of collisions and other accidents.

New types of day and overnight coaches, new sleepers, diners, recreation and lounging cars, have been designed and many are now in use or under service tests. The ordinary coach will be clean, air-conditioned, and have comfortable seats and ample wash rooms. A "day-nite" coach is the railroad's answer to the passenger's plea for a more comfortable overnight coach. Increased space between seats gives more leg-room and provides a space for a new type of foot and leg rest which, in combination with reclining chairs, permits a comfortable position for sleep.

Three-Tier Sleepers

For Pullman sleepers, in addition to new type compartment cars, a three-tier arrangement is already in use transporting soldiers, and promises to become standard for public transportation when the war troubles are over.

In this sleeper all seats are on one side of the aisle. Individually private, air-conditioned and easily accessible berths are made up at night in sections of three or six. Each section contains a concealed wash basin. The car has 42 berths, a capacity high enough to permit the lowering of the cost of sleeping accommodations to the public.

Improved Diesel-powered locomotives, and electric motors taking currents from overhead wires or third rails, will continue in use and probably will replace many of the familiar coal-burning, smoke-belching locomotives, but coal-burners or oil-burners will continue in use. However, they will no longer belch smoke or suffocating fumes because new principles of combustion, already put into practical application, will get more power out of the fuel and will consume the smoke and all combustible gases.

Already in Service

Several locomotives of improved types, but quite different in appearances, are already in service, others are under construction, and still others are in the design stage. They do not have the familiar cylinders, piston-rods and other reciprocating parts of the conventional locomotive. They are turbine-engined or electrically driven.

One of these new type power units is a steam-turbine locomotive, a coal-burner with great power and high speed that is now in service for actual road tests. Its coal compartment is at the front end, a combination cab and boiler section is next, and a water compartment is at the rear. The low smokestack is at the rear of the boiler section. This is the new Pennsylvania "Triplex." (*See SNL*, April 7.)

Another new type is the electrically driven locomotive with motors powered by a coal-burning steam turbine, which will soon be under construction for the Chesapeake and Ohio railway. None of this type are yet in use in this country. In it, in a single unit, is a coal compartment at the forward end, the engineer's cab next, then the boilers, and last the electric motors that drive the wheels.

Gas-turbine engines have also entered the locomotive field. At a recent meeting of the American Society of Mechanical Engineers, the details of a 4,800-horsepower electric-drive locomotive powered by two gas turbine units were revealed. It is a powerful unit of great speed, and is economical to operate. Tests will determine its future on American roads.

To the traveling public the passenger car seems to be first in importance, but to the railroad man the track is number one. No matter how modern the train, safety, speed and comfort are dependent first on the roadbed and the lines of steel on which the flanged wheels of the cars cause whole trains to follow a power unit. Ballast, rails, curves, grades, bridges, tunnels, and signal devices are factors of roadbed and track problems.

Roadbed construction, the work of civil engineers, has progressed to a point insuring greater permanency, elasticity and ease of riding. Metallurgists are producing steel rails superior to those of the past, and safer to ride over. Welding the ends of the rails together, to form continuous rails thousands of feet in length, eliminates wear, particularly at joints, and the nerve-wracking click-click of the wheels.

Rail joints in the future will be few and far between. Expansion gaps between rails of the ordinary length are found unnecessary. The heat of summer and the cold of winter cause compression and tension, but both within safe limits if the rails are properly spiked against buckling.

More trains can move on a single track with the new centralized traffic control system. With it a dispatcher sits in an office, watching on a board the movements of all trains in his territory, which may stretch several hundreds of miles, and controls the movements of these trains by moving tiny levers and pushing buttons which operate signals and switches many miles away. On one 300-mile stretch of single-track railroad equipped with this system, twice as many cars now cover the stretch each day as did before its installation.

Somewhat similar in results are the new radio-telephone systems now under trial, that give constant communication between train dispatchers, locomotive engineers, and train conductors, and enable members of crews on the same



POSTWAR COMFORT—A button in the chaise lounge seats designed by Pullman releases a leg rest from the seat ahead, providing full-length comfort.

train to talk with each other at will.

The safe speed of a train depends upon the efficiency of its braking system. Before air-brakes were discovered and put in use on railroad trains, speed was necessarily low. With their installation safe speeds doubled and tripled.

The postwar braking system will be the new automatic and electrically operated type that applies a selective pressure upon the brake shoes throughout the entire stop so that the rate of deceleration is uniform all the way. It is pronounced the fastest, smoothest and safest system ever developed, and with it the present neck-jerking jolts resulting

from manually operated systems will be eliminated.

Hot boxes on the axles of railroad cars have for years been the railroad man's bugbear. New and better lubricants and methods of application help, but a new electrically operated warning system attached to each journal box on the train permits remedial steps before an overheated bearing causes a train to stop. When the heat in the journal box rises above a safe temperature, an electric circuit is activated and lights a red danger signal, ringing a buzzer in the car and in the engineer's cab.

Science News Letter, May 19, 1945

PHOTOGRAPHY

20 Million Photos a Month

► BY MILITARY necessity, the Army Air Forces have become the world's largest users of photographic film, paper, and equipment, reports Maj. Gen. Bennett E. Meyers, director of the Air Technical Service Command at Wright Field. More than 20,000,000 photographs a month are made for military purposes, he revealed.

These photographs, many of which are made from airplanes flying over enemy territory on reconnaissance missions, show the enemy's industrial areas, mili-

tary installations, rivers and roads, and deployment of troops. After being analyzed by air intelligence officers, the information contained in the photos is transmitted to our bombing squadrons, land armies, and amphibious forces. Gen. George S. Patton once stated that he would not move a single man unless he had photographs of the place that the man was to move to, Gen. Meyers declared.

Without these photographs, our military forces would (Turn to page 317)



Dagobert D. Runes, Editor

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Do You Know?

Fluorescent lighting has been installed in a railway coach in Canada.

The female *shrew* interlaces leaves to make a roof for the nest.

Wine-making in Peru dates back four centuries.

There are about 80 different kinds of *birds-of-paradise* in New Guinea.

Tree frogs have special adhesive disks on their toes to enable them to climb trees.

Mexico raises at least 55 kinds of *beans* for food, some of which have over 30% protein, but many with 20% or less.

A *lacquer* made from milk has been developed as a substitute for tin coating on cans used for evaporated and condensed milk; it is made largely from lactic acid, with a small proportion of castor or other vegetable oil.



FIVE BENEFITS when MICROMAX CONTROLS ACID BATHS

Several specific benefits came to Botany Worsted Mills when they changed from manual control of carbonizing baths to Micromax Automatic Conductivity Control.

(1) Bath strength is more uniform. (2) Less acid is used. (3) Color is more "level". (4) Production is smoother. (5) The process is automatically recorded.

The Micromax equipment used in carbonizing is also used for such purposes as regulation of mercerizing sours, kiers and fabric washing; and similar equipment helps in the manufacture and recovery of various alkalis.

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PSYCHOLOGY

Prisoners May Be Gloomy

Americans who have been held for a long time by the Germans may blame themselves. They need reassurance that their part in the war is appreciated.

➤ THOUSANDS of American prisoners of war, released with the complete defeat of Germany, will be returning from their Stalag life feeling depressed, lonely and bitter, as well as overjoyed.

Depression is a natural feeling for a man who has spent a large part of the war, or even only a few weeks, on the wrong side of barbed wire.

If you were taken prisoner and removed suddenly from combat where your friends were fighting and constantly in danger of death, you could not help some feeling of regret and shame at not being there with them to share their fate, their hardships and their dangers.

The man who is made prisoner of war is suddenly removed to where his own danger is not so great. But all opportunity to strike at the enemy is taken away. He is disarmed. He is humiliated. He is helpless.

He is hungry. He is deprived of all comforts. He, usually, must walk many miles until he is utterly overcome by physical weariness. But the walking is generally away from his own army, away from the point where his duty lies; away from the fight.

Naturally, his emotions, if he has strength enough left to feel emotions, are confused and conflicting.

He is angry and suspicious of his captors. At the same time he cannot help feeling relief—a letdown—at being removed from the imminent danger of death in combat. Inwardly most prisoners of war are blaming themselves, kicking themselves for letting themselves get caught, trying over and over to figure how they might have acted differently and avoided capture. There is no real reason for this feeling; they could no more avoid capture than many of their friends could avoid death. Yet the feeling is a natural one. It is the worst torture of the military prisoner.

From reports received since the liberation by American troops of some of our prisoners in Germany, this natural feeling of captured men was played upon to the utmost in a final war of nerves by the German captors, who forced the men to listen to taunts and accusations of

cowardice and weakness.

It is a feeling that the families and friends of returning prisoners must battle to remove by free expression of admiration and gratitude for the bravery and grim endurance these men have all displayed.

In addition to the depression and unfounded sense of guilt sometimes felt by the prisoner of war, these men may feel the natural strangeness that comes from complete isolation. Especially those who have been imprisoned for a long time have been cut off from all knowledge of what was going on at home and everywhere else in the world. They have a tremendous amount of catching up to do before they are abreast of the news.

Many have built up as a defense against their captors an ability to hide their thoughts and emotions that may be a hindrance in becoming intimate again with their families. It takes time to learn to let down such barriers again and talk freely.

Men who have been prisoners for a long time have also had to build up a habit of constant alert suspicion against other men, particularly those in authority. It often takes time, too, to break this habit and learn again to trust other people.

It takes time plus a real friendliness and personal interest on the part of everyone who has the privilege of dealing with the men who have made such a tremendous sacrifice for their homes and their country.

Science News Letter, May 19, 1945



WYOMING

A Summer to remember

The 900-acre Paton Ranch will give you trout-fishing in a mountain stream in the foothills of the Big Horn mountains, daily horse-back rides along picturesque canyon trails and excellent food—most of which is grown on the ranch.

The region abounds in geological and historical interest—dinosaur bones, marine fossils and implements used by the Indians many years ago.

Write for illustrated, descriptive folder

PATON RANCH, SHELL, WYOMING



Distinguished Kinships

➤ NO MATTER how democratic we may be, any of us is likely to take a second, interested look if a neighbor, who has nothing in particular to distinguish him from the rest of us, is pointed out as first cousin to a Duke, or nephew of a Sultan.

It is much the same way with plants. A rather ordinary-looking wildflower or weed somehow assumes dignity, even glamor, when we are told of its kinship to an important or valuable exotic botanical family.

To most of us, probably, the word "orchid" connotes flowers of strange, almost weird beauty, perched like gorgeous butterflies high on the limbs of jungle trees, to be collected only by daring adventurers at imminent risk of life and limb. When delicate but rather insignificant-looking little wildflowers in our northern woods are pointed out to us as orchids we feel vaguely disappointed, yet somehow thrilled. And when it comes to that, we have at least a few species of our own that need not yield anything to any of their tropical cousins, for the lady's-slippers or moccasin-flowers are members of the orchid family.

Less thrilling, perhaps, is the story of our native plants that are fairly close kin to the Hevea rubber tree, as well as to the flaming, exotic poinsettia of Christmastide. These distinguished foreigners belong to the euphorbia or spurge family, and most of our 30 or 40 native spurges are weeds—poor relations, as it were. Only one or two of them have been considered worthy to occupy even minor places in cultivated gardens.

Perhaps the most interesting of all these connections with noted plant families in foreign lands are to be found

among the aroids American representatives of this family include jack-in-the-pulpit, its rarer cousin the green dragon, and the too-much-despised but really worthy skunk cabbage. These, as well as two or three other American species, are close cousins to the taro plant, staff of life to thousands of South Sea Islanders, to the delicious-fruited Monstera of the tropical Americas, and to such carefully imported ornamentals as calla lily and the caladium or elephant-ear of formal gardens and parks.

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suffer a much larger number of casualties, to say nothing of the valuable planes and equipment, Gen. Meyers pointed out.

One aerial reconnaissance group averages 60 missions a day, with a minimum of 180 cameras used. Each camera carries a 200-foot roll of film, on which 250 pictures can be made. Thus one group alone exposes 45,000 negatives in a single day. Approximately 50 to 60 prints are made from a large proportion of these negatives for distribution to essential persons.

In addition to reconnaissance photographs, other types of pictures are taken including training films and still pictures, still photographs of equipment, artillery fire control pictures, fighter gun camera pictures that reveal new types of aircraft in use by the enemy and the vulnerable points on these planes, and still other types of pictures for use in preparing maps and charts.

In an effort to conserve photographic film and paper, technicians at the ATSC photographic laboratory have produced a new developer that makes it possible to use photographic paper which has become fogged by age. Chemical costing \$1,000 saves over \$100,000 worth of paper that would otherwise have to be thrown away, Gen. Meyers stated.

Science News Letter, May 19, 1945

An *alligator's ear* is so well hidden by a flap of skin that few recognize it; it is behind the eye and rather high on the head so that it is over water when the alligator lies on the surface; the flap closes tightly when under water.

The quantities of *amino acids* in foods are now determined, using a color-measuring instrument, by the intensity of color produced when a food is combined with certain chemicals; amino acids are "building blocks" in proteins.



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ICHTHYOLOGY

Undeveloped Food Supply

Swimming off the shores of the southern states is an abundant supply of fishfood. Artificial oceans are suggested for growing species for market.

➤ SWIMMING off the shores of the southern states is an abundant supply of fishfood, now only partially used, that with proper development, could furnish the people of these states with an expensive diet rich in proteins, carbohydrates, fats, minerals and vitamins. It also could furnish the South with needed

chicken feed and fertilizer from wastes, and yield large net incomes from fish and fish products shipped to the North and West.

This is the opinion of Harden F. Taylor, former president of the Atlantic Coast Fisheries Company, expressed at a conference at the University of North Carolina, which just celebrated its fiftieth anniversary. Regional welfare was the general subject of the conference at which he spoke.

The coastline of the southern states stretches about 2,500 miles from the Virginia capes to the Mexican border, but if defined indentations are included, he said, it is about 4,500 miles long.

"While the greater part of the Atlantic ocean is about two miles deep," he continued, "the land does not pitch off suddenly at the shore into the abyss of the ocean. There is an under-water ledge, beginning at the low-tide and gently sloping off-shore to the 100-fathom line which lies about 50 miles to sea along our southern states, and roughly parallel with the shore line."

This ledge area includes roughly 175,000 square miles, and the marine resources of the southern states are mainly on it.

"Considering the large area of sea bottom, and the fact that every square mile of it is a natural food factory," Mr. Taylor added, "the total yield of the fishery has not been and is not now of impressive magnitude, and the South is not making the most effective use of what is produced."

Scientific research is essential if the fishing industry of this area is to be properly developed, he indicated. This must include not only matters having to do with fishing and marketing, but also a biological appraisal of the fundamental productivity of the area.

"Such studies," he said, "might also show that the growth of vegetation in seawater outruns the conversion of that vegetation into animal life, and that vegetarian fishes might be advantageously transplanted from other parts of the world, such as the California or Mediterranean sardine, to increase the total amount of grazing and therefore of fish substance in the sea."

"Many areas of the world," he added, "have valuable species which cannot get here under their own steam, for example the soupfin shark of the Pacific coast, whose livers are the richest known source of vitamin A."

Mr. Taylor mentioned the develop-

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ment of oyster growing in indented bays along the coast.

"A fascinating extension of this general idea," he declared, "is the possibilities of other plankton-consuming marine animal species in enclosed bodies of salt water. If we seal off a salt lake, of, say,

a square mile, and supplied the fertilizers necessary to grow plankton, oyster and other plankton eaters would grow rapidly. Such highly prized species as shad, and possibly pompano, might be land-locked and grown for market."

Science News Letter, May 19, 1945

Books of the Week

➤ A SHORT CUT to navigation is given in **ASTRONOMICAL NAVIGATION WITHOUT MATHEMATICS** by Lt. Col. A. L. Mieville, an engineer formerly in the British Army. It is a popular-technical pamphlet for the thousands of young men who must master the elements of the science and who would have great difficulty in understanding the ordinary technical textbooks. The method described is fast, accurate and simple. One sum of addition is all the mathematics required. (Macmillan, 65c.)

Science News Letter, May 19, 1945

➤ GUNS AND BOMBS, the weapons we fight with in the air, are often more vital in combat than the design and performance characteristics of a plane. The average student of modern warfare knows his planes, and will find the history and development of aerial fire power exciting reading as presented in **AIRCRAFT ARMAMENT** by Louis Bruchiss (*Aerosphere*, \$6). From blockbusters to incendiaries and from .30 caliber machine guns to rockets, it presents the Allied flying gun platforms with clarity and completeness that will satisfy both technical and non-technical readers. Not only does it bring you up to date but the discussion of future air warfare, duplex projectiles, radio-controlled robot planes and aerial torpedoes, will start you to thinking. A photograph or drawing on almost every page.

Science News Letter, May 19, 1945

Just Off the Press

EBULLIOMETRIC MEASUREMENTS—W. Swietoslawski—*Reinhold*, 228 p., illus., \$4. "A comprehensive description of the ebulliometric method for measuring the boiling and the condensation temperatures of liquids and solutions."

ELECTRICAL DRAFTING, Applied to Circuits

MATHEMATICS DICTIONARY

Second Printing, Second Edition

American Library Association's, Subscription Books (encyclopedias, dictionaries, etc.) Committee says in Subscription Books Bulletin, Oct. 43: "In its subject field there is no work directly comparable to the Mathematics Dictionary. Because of its usefulness to anyone seriously interested in mathematics, the volume is recommended for personal, school or library purchase. For those already possessing the 1942 edition, purchase of the 1943 edition is suggested only if the dictionary is extensively used or a second copy is desired." Send \$3.00 to Digest Press, Department 3B, Van Nuys, California, or Science News Letter.

and Wiring—D. Walter Van Gieson—*McGraw*, 140 p., illus., \$1.50.

FIRST AID, SURGICAL AND MEDICAL—Warren H. Cole and Charles B. Puestow—*Appleton-Century*, 351 p., illus., \$3, 3rd ed. For medical students and others wishing to make a more serious study of first aid than is included in the usual courses for amateurs.

HAYFEVER PLANTS, Their Appearance, Distribution, Time of Flowering, and Their Role in Hayfever, with special Reference to North America—Roger P. Wodehouse—*Chronica Botanica*, 245 p., illus., \$4.75.

INTRODUCTION TO PRACTICAL RADIO—Durward J. Tucker—*Macmillan*, 322 p., illus., \$3.

POPULATION ROADS TO PEACE OR WAR—Guy Irving Burch and Elmer Pendell—*Population Reference Bureau*, 138 p., paper, \$1; cloth, \$2.

PRACTICAL AND THEORETICAL PHOTOGRAPHY—Julian M. Blair—*Pitman*, 243 p., illus., \$2.50, 2nd ed.

TEXTBOOK OF ORGANIC CHEMISTRY—E. Wertheim—*Blakiston*, 867 p., illus., \$4, 2nd ed.

Science News Letter, May 19, 1945

PHYSIOLOGY

Effect of Sugar on Health To Be Studied

➤ MOTHER will soon have the benefit of new scientific research to guide her when Johnny begs for more cake or candy.

The effect on health, growth and physical condition of children of diets containing lots of sugar and of other diets containing very little sugar is going to be measured by Dr. Pauline B. Mack and associates of the Ellen H. Richards Institute, Pennsylvania State College, under a \$20,000 grant for one year from the Sugar Research Foundation.

Five other grants were announced by the Foundation's scientific director, Dr. Robert C. Hockett. These are:

Dr. Rachmiel Levine, director of metabolic and endocrine research at Michael Reese Hospital in Chicago, \$7,500 for one year, to study the physiological behavior of levulose, a sugar produced by inversion of ordinary sugar.

Prof. I. L. Chaikoff, associate professor

of physiology at the University of California, \$7,400 for two years, to study the protective action of sugar against cirrhosis of the liver.

Natural Resources Research Institute of the University of Wyoming, \$4,000 for one year, to investigate utilization of pectin from the pulp of sugar beets and to study derivatives of beet pectin.

Dr. Dora Stern, literature consultant, \$4,000 for one year, to devise a system for classifying sugar derivatives, and to compile a list of new derivatives discovered since 1930.

Dr. I. M. Rabinowitch of McGill University Medical School, Montreal, \$2,500 for one year, to study further the body's relative rate of absorption of sucrose, dextrose and levulose.

The Foundation members include growers and processors of beet and cane sugar from the continental United States, Hawaii, Puerto Rico, Cuba, Canada and Haiti. Joseph F. Abbott of New York is president.

Science News Letter, May 19, 1945

One 56-inch tire on a bomber has enough nylon in it to make 260 pairs of women's hose.



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☛ **CHOWMOBILES**, rubber-tired mobile restaurant vans for feeding workers in shipyards, are 16 feet long and 10 feet wide and can serve 600 persons in a half-hour as the workers pass in line under the removable sides that open up to form a canopy. Hot lunches are served in paper containers.

Science News Letter, May 19, 1945

☛ **HAND PLANTING** plow for the home garden can be adjusted to control the depth of the furrow. The triangular plow is pulled by a handle which has a downward projecting rod attached near the plow, with a cross arm at its lower end. Adjustment is made by sliding the upper end of the rod along the handle.

Science News Letter, May 19, 1945

☛ **SNAP-IN** electric lamp bulbs, pushed instead of screwed into the sockets, have from one to three small metallic spring plugs, inserted on the side of a plastic base. These plugs, wired to the filament, fit into the grooves in the ordinary threaded socket.

Science News Letter, May 19, 1945

☛ **NURSING BOTTLE**, with special arrangement to admit air above the surface of its liquid contents and thus let the milk flow freely, is a double-neck affair with the nipple attached to one neck and an air-intake device on the other. Liquid cannot spill out of the air-intake neck when the bottle is in the ordinary nursing position.

Science News Letter, May 19, 1945



☛ **ULTRAVIOLET** and infrared rays are both transmitted from a lamp usable in any ordinary house socket and give mother and baby, as shown in the picture, a sun-tan three times as fast as the sun itself. The ultraviolet rays result from electric discharges through mercury vapor, the others from a tungsten filament inside the bulb.

Science News Letter, May 19, 1945

☛ **STAR IDENTIFIER**, a transparent semispherical gauge with latitude and meridian lines, helps an observer locate stars. It is held before the face with one eye at the center of its circular base and

rotated until two navigational stars are seen through designated apertures. Other stars may then be identified.

Science News Letter, May 19, 1945

☛ **ELECTRICALLY** operated vaporizer, for use in sickrooms or as a humidifier in offices, is housed in a radio-size plastic case and gives a "dry steam" type of vapor within a minute after connection to an electrical outlet. It holds two quarts of water and has a special compartment for the medicant.

Science News Letter, May 19, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 259.

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Question Box

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What has made one-handed flying easier? p. 309.

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Why may Americans who have been held for a long time by the Germans feel depressed as well as overjoyed when they are released? p. 316.

PUBLIC HEALTH

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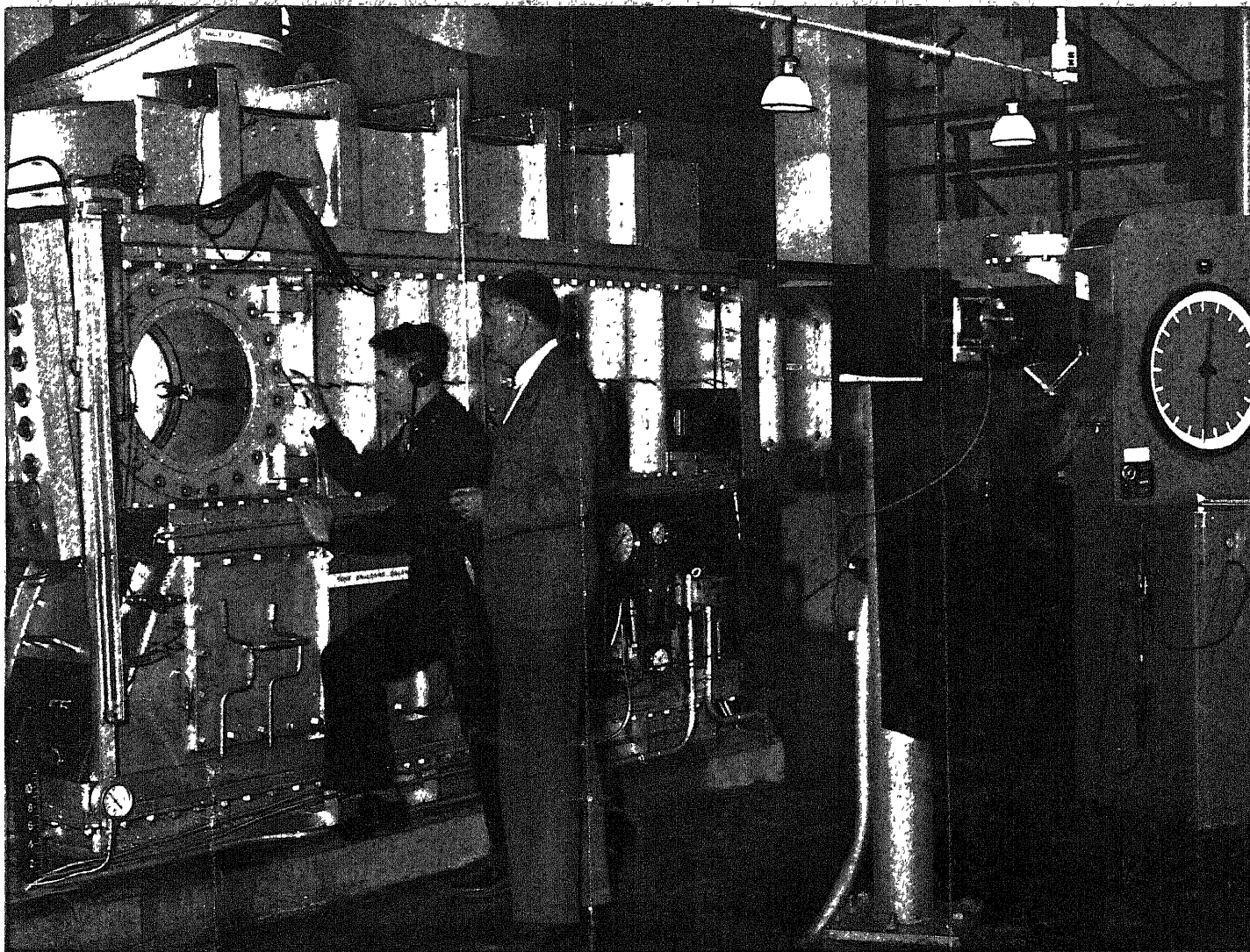
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SCIENCE NEWS LETTER



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THE WEEKLY SUMMARY OF CURRENT SCIENCE • MAY 26, 1945



Supersonics
See Page 326

A SCIENCE SERVICE PUBLICATION

Life hangs by such threads



WANTED: Something to keep flyers from freezing. So engineers developed electrically heated goggles, shoes, suits... Something dependable to guide pilots in fog and dark. So engineers devised electrically driven gyroscopic instruments. ... Something automatic to keep engines from overheating or cooling. And now comes an electric control the pilot needn't touch.

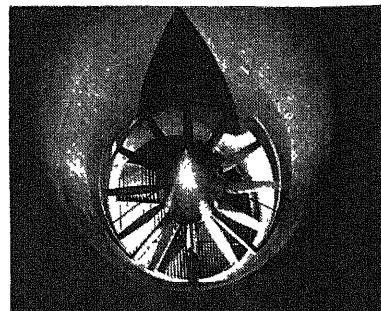
Working day and night, G. E.'s research and engineering staff has solved hundreds of such problems. The pictures here show how a few have been met. Through research come better electrical products and processes—in war or peace. *General Electric Company, Schenectady, N. Y.*



Flyers' lives often depend on their instruments. G-E workers use only tweezers to handle these precious parts of electrically driven gyroscopic instruments, dry them with air jets, oil them with hypodermic needles. They've got to be accurate.

Eyelids can freeze shut when you're 7 miles up! Electrically heated goggles, developed by G-E engineers, have fine wires embedded in plastic lenses. With G. E.'s electric blanket as a start, G-E engineers designed electrically heated flying suits, heated gloves and shoes being made in three G-E plants. Toughest problem was to devise heated gloves with thin wires strong enough to stand constant flexing.

Before it's built, they know how it will fly! 18,000 horsepower of G-E motors blow winds faster than a pursuit plane can fly. Testing model planes and parts up to full size and speed in wind tunnels like this helps get new airplanes perfected quicker.



Making night landings safer. Engineers adapted the G-E "Sealed Beam" auto headlamps into war use—G-E airplane landing lamps 20 times brighter than those on your car. Sealed against dust, dirt and salt water damage, they cut down the peril of high-speed landings.

Hear the G-E radio programs: *The G-E All-girl Orchestra*, Sunday 10 p.m. EWT, NBC—*The World Today news*, Monday through Friday 6:45 p.m. EWT, CBS—*The G-E House Party*, Monday through Friday 4:00 p.m. EWT, CBS.

FOR VICTORY—BUY AND HOLD WAR BONDS

GENERAL ELECTRIC

MEDICINE

Life-Saving Operation

The blood is diverted from normal channels and shunted through the lungs by artery joining in new attempt to save "blue" babies.

➤ A NEW operation which gives "blue" babies born with malformed hearts a chance to live has been devised by Dr. Alfred Blalock, professor of surgery at Johns Hopkins Medical School.

The operation, though life-saving, involves such vital structures that the doctors waited a year after devising it before they dared to try it. It has now been performed successfully on three children, Dr. Blalock and Dr. Helen B. Taussig, of the pediatrics department at Hopkins, report. (*Journal, American Medical Association*, May 19)

One was a 14-month-old baby girl weighing less than nine pounds, too weak to be able to sit up alone, refusing her feedings and steadily losing ground. The second was a 12-year-old girl who could not walk 30 feet without panting. The third was a six-year-old boy so incapacitated that he could not walk and would not try to take even a few steps.

Shortly after the operation he had changed from a "miserable whining child to a happy smiling boy," with cherry-red instead of purple lips and good skin color. From refusing even to try to walk, he protested vigorously against being kept in bed three and a half weeks after the operation while his temperature returned to normal.

The baby's improvement has been "striking". She eats well, is alert and active though before the operation she was so sick she seemed to be mentally retarded. Her weight has increased by one-fourth and she is learning to walk.

The older girl improved equally well. Two and one-half weeks after the operation she walked 60 feet, sat down and rested a short time, and walked another 60 feet without panting or other difficulty.

The surgery which has brought new life to these children and promises to do the same for others is an artery-joining operation. Each of them was born with a defect of the big artery supplying blood to the lungs. The artery was so narrowed that only a little blood could be pumped through it. That little blood could not pick up enough oxygen to supply the body. That was why the children were so weak, panted on exertion, and had deep blue colored skins.

To overcome the defect, Dr. Blalock cut one of the arteries supplying blood to parts of the body outside the lungs. One end of this artery was brought around and sewed to a slit made in the right or left branch of the lung artery. In this way some blood was shunted from the general supply to one of the lungs where it picked up oxygen to carry into the rest of the blood circulating throughout the body.

The operation is a long one, taking from an hour and a half to three hours. The chest must be cut open from the breast bone to the underarm line, ribs spread apart, the arteries found and cut away from adjacent tissues, and each artery clamped in two places to prevent hemorrhage when they are cut. The artery chosen to supply the extra blood to the lung artery was either one of two that normally supply blood to the neck, head, chest, shoulder and arm. The end not attached to the lung artery had to be tied securely to prevent bleeding. (Other arteries take over its normal job.)

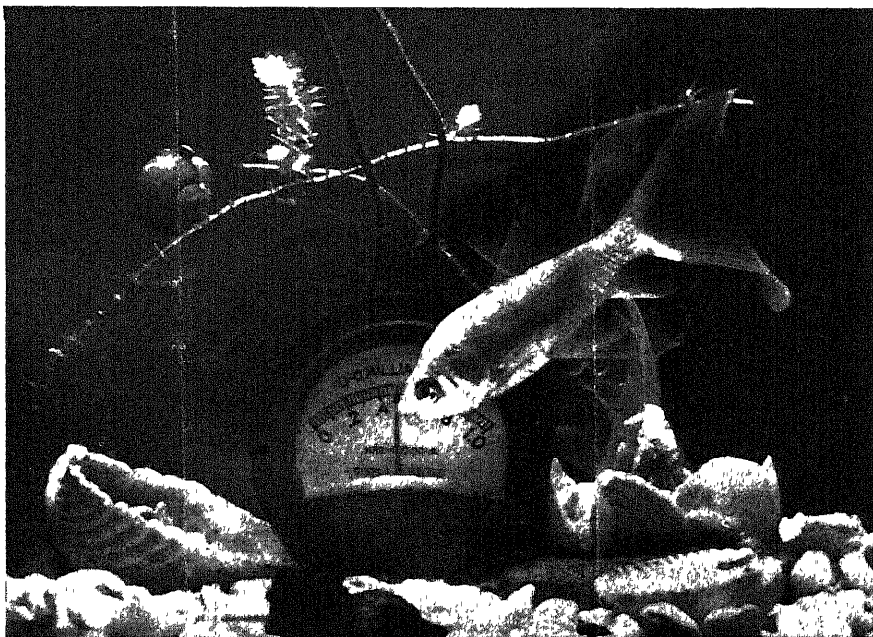
The lung had to be re-expanded and the cut in the chest wall closed.

During the operation, an artery to one lung had to be clamped so that no blood could get through for from half an hour to an hour and a half. The doctors were afraid a child already suffering from severe oxygen want would not be able to stand this strain. So they put off trying the operation for a year after they were sure it was otherwise a sound procedure. They hoped to find a way of giving oxygen by vein or some other way in addition to inhalation. Inhaling it takes it into the lungs but the children were unable, even before the operation, to get enough into their blood from their lungs.

Because of the war, it was impossible to get equipment for giving oxygen by vein. So they went ahead with the usual general anesthetics, ether for the baby and cyclopropane with a high concentration of oxygen for the other two children, and found the children came through the operation satisfactorily.

The operation will not help all patients with heart defects that cause persistent cyanosis (blueness of the skin), the doctors emphasize. It helps only when the primary difficulty is lack of blood circulation to the lungs.

Best age for the operation is between four and six years, though in some cases it must be done within the first few days



NO HARM DONE.—A new sealing process makes it possible for delicate electric instruments to remain days under water without injury. They withstand dust, fungi and temperature changes. (See next page)

or weeks of life if the baby is to be saved.

Since the operation has never been done before, what the future holds for the children remains to be seen. They may later develop heart failure or sub-

acute bacterial endocarditis, the doctors point out. They maintain, however, that fear of these conditions in the future, is "no justification" for letting the patient die of oxygen want in the present.

Science News Letter, May 26, 1945

ANTHROPOLOGY

Normal Face Measured

➤ HEADS of over 3,000 soldiers were measured to find the most comfortable gas-mask size. Ten different head types were established, and it was found that men from the South, where there is more of a native unmixed Anglo-Saxon strain, have the largest heads, while those who hail from New England have the smallest.

The tests were made under the direction of Dr. Earnest A. Hooton of Harvard University by a group of anthropologists, including John C. Kelly and Paul Reiter, in cooperation with the Chemical Warfare Service and the Massachusetts Institute of Technology. It is the first big study of its kind to be made by the Government.

A new measuring instrument, the "faceometer," was used in the tests conducted at Camp Sibert, Ala. This device measures the face in three principal dimensions—length, depth, and breadth—and 62 other facial landmarks. After considerable practice, operators can take all measurements in less than two minutes. The information gathered has helped the Chemical Warfare Service to find three types of gas masks which will fit every soldier in the Army.

As a result of the tests, the average head among men in the Army was found to have a face length, from tip of chin to nose depression between the eyes, of 124 millimeters (about five inches); face breadth, from temple to temple, of 141 millimeters (not quite six inches); and face depth, from tip of nose to ear passages, of 123 millimeters. These figures were supplied by Capt. R. A. Chadbourne of the Chemical Warfare Service in Boston.

Men from the ranks who were used as subjects represented every state in the Union, as well as Alaska, China and the Philippines. They were examples of a dozen racial extractions. Five normal and five unusual head sizes were established by correlating principal measurements representing breadth, depth, and length of face. The normal type includes an average head, two large, and two small

sizes. The unusual types are those in which two of the principal measurements are normal, while the third is not.

It was found that 65% of the soldiers measured normal medium; 19% medium small, and 11% medium large. About 4% of the heads were small, while only 3% were large. In the unusual size, 7% had "short, fat faces," the largest single category in that group.

In addition to helping the Chemical Warfare Service design standard gas masks, these authoritative data have aided the Quartermaster Corps in determining hat sizes; the Army Air Forces, for goggles and head fittings; Ordnance, for placing of artillery gunsights and for headspace in tanks and other vehicles; and the Signal Corps for communication apparatus head fittings.

They also have a direct postwar bearing on fitting eyeglasses, manufacture of hats, dental and medical service; shape of telephone headsets; use of goggles and eyeshields in industry; spacing of seats and headroom in planes, trains, and buses.

Science News Letter, May 26, 1945

ENGINEERING

Delicate Instruments Remain Days Under Water

➤ DELICATE electrical instruments may remain for days under water without injury if sealed by a method developed and used by the General Electric Company that also protects them against humidity, dust, fungi, discolorization and other adverse conditions. Instruments so protected have been suddenly transferred from temperatures of 67 degrees below zero Fahrenheit to 165 degrees above without inflicting any change in their performance.

The method is the result of extensive research by scientists of the company to find a way to offset difficulties in the tropics, deserts and high altitudes, where electric instruments failed because of moisture, climatic and other conditions. It is claimed to be the first successful

means of hermetically sealing an instrument with moving parts.

To obtain a hermetically sealed enclosure, a thick, special, stain-free glass window is fused to a metal ring in a glass-to-metal seal. This assembly is then fused to a steel case by a soldering joint. Hermetic sealing of the two terminal studs is obtained by glass-to-metal seals between each metal stud and the metal eyelet.

The final assembly is evacuated, filled with an inert gas through a tube located in the base, and is sealed off at a pressure slightly above atmospheric.

Science News Letter, May 26, 1945

SCIENCE NEWS LETTER

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ASTRONOMY

Comet Is on Schedule

Famous Pons-Winnecke comet, known for more than a century and last observed in 1939, is making its return this year as expected.

► FAMOUS Pons-Winnecke comet, known for more than a century and last observed in 1939, is making its return this year right on schedule. The Harvard astronomical clearing house has received a telegram from Dr. V. M. Slipher of the Lowell Observatory, Flagstaff, Ariz., stating that Henry L. Giclas, Lowell astronomer, had observed Pons-Winnecke.

Its position and motion agree well with positions predicted on the basis of the path followed by the comet in 1939. It is not exactly the same, however, for the comet has a period of revolution around the sun about one-half that of Jupiter. The big planet takes 12 years and the comet slightly more than six, so on alternate revolutions the comet passes near the planet. Jupiter's gravitational pull is so great it has been constantly enlarging the orbit of Pons-Winnecke.

In 1819, the year Pons at Marseille discovered it, the comet's nearest approach to the sun was about 72 million miles; in 1909 it passed within only 90 million miles, and in 1939 it was 102 million miles from the sun at nearest approach. This year about July 8 it is expected to approach within 108 million miles of the sun, which is 15 million miles farther out than the average earth-sun distance.

Mr. Giclas found the comet on May 3 to be of the 14th magnitude, making it invisible except in large telescopes or on long-exposure photographs. The comet will probably get brighter, but in 1939 it reached only the ninth magnitude, and this year it has not approached the earth as closely as in 1939 so tenth or eleventh magnitude is probably the brightest we can expect it to become. It will probably remain of observing interest only to professional astronomers and to amateurs with large telescopes.

Comet Pons-Winnecke is associated with a meteor shower last seen in 1916. We may see the shower again in 1946.

Science News Letter, May 26, 1945

1 Rediscovered Comet Kopff

► ONLY a few days after he had rediscovered one periodic comet which was

returning to the sun right on schedule Henry L. Giclas, astronomer at Lowell Observatory, Flagstaff, Ariz., duplicated his discovery for comet Kopff, which is also running close to schedule.

Dr. V. M. Slipher, director of Lowell Observatory, telegraphed the Harvard Observatory clearing house reporting Mr. Giclas' second discovery and giving the position for comet Kopff on May 7 in the zodiacal constellation of Libra the Scales.

The motion of the comet will bring it into continually favorable observation for northern hemisphere observers. However, it is of the 13th magnitude, nearly as faint as comet Pons-Winnecke, located by Mr. Giclas earlier at the 14th magnitude.

Coincidence abounds in this re-discovery of these two periodic comets. They both take slightly more than six years to go around the sun and were last seen in 1939. They both are so faint as to be visible only in large telescopes, and neither is expected to be of anything like naked-eye visibility on this return. Pons-Winnecke passes the point in its orbit nearest the sun in July, and comet Kopff passes that position in its own orbit about a month later. Neither comet is following exactly the path computed for it because on its latest circuit of its orbit it passed very close to Jupiter, and was considerably perturbed by the gravitational action of that massive planet.

Science News Letter, May 26, 1945

MEDICINE

Streptomycin May Be Remedy for Typhoid

► STREPTOMYCIN, one of the newest of the penicillin class of anti-germ chemicals, may turn out to be a remedy for typhoid fever that will both get the patient well quickly and keep him from becoming a typhoid carrier.

Its use in five cases has been reported by Dr. Hobart A. Reimann, Dr. William F. Elias and Dr. Alison H. Price of Philadelphia. (*Journal, American Medical Association*, May 19)

Three of the five patients recovered

during the streptomycin treatment, apparently as the result of it. In two cases there was an abrupt end of the fever and recovery quite unlike the usual course of events in typhoid.

The value of the drug cannot safely be judged on the basis of results in five cases, the doctors point out, particularly in typhoid fever, which is a disease of unpredictable severity and duration.

The drug was not available in time to give it early in the disease. The size of the doses and the way to give it, whether by mouth or by hypodermic injection, had to be worked out as the patients were being treated. These matters may have affected the results.

The evidence from the five cases shows, the doctors state, that streptomycin "offers much promise" as a substance capable of routing the typhoid germs from the blood and urinary tract when injected hypodermically in big enough doses and of eliminating typhoid bacilli from the intestinal discharges when given by mouth. This last suggests that the drug may keep typhoid patients from being carriers when they recover.

Science News Letter, May 26, 1945

MEDICINE-NUTRITION

Diet May Influence Resistance to Viruses

► RESISTANCE to virus diseases such as infantile paralysis can be influenced through diet but the exact method of doing it has not yet been worked out, Dr. C. A. Elvehjem of the University of Wisconsin told members of the American Chemical Society at a meeting in Milwaukee.

Mice starved of vitamin B₁ are definitely more resistant to infantile paralysis virus than mice getting optimum or excessive amounts of the vitamin.

However, he pointed out, we cannot try to prevent infantile paralysis by producing universal beriberi, the disease which results from lack of vitamin B₁.

When all the facts are known, Dr. Elvehjem said, the effect of diet on disease resistance will undoubtedly not be related to the amount of a single vitamin or nutrition factor but more likely to the ratio of several different ones.

He warned against drastic changes in the diet until the effects on the total nutrition are known. Nutrition programs that are harmful instead of beneficial may result, he said, if "we use too extensively the fragmentary knowledge which is now available."

Science News Letter, May 26, 1945

ORDNANCE

3,000 Miles-an-Hour!

Two new wind tunnels can produce speeds up to four times the speed of sound. One is for bombs, the other for ballistics.

See Front Cover

➤ TWO WIND tunnels costing a total of \$2,000,000, that will produce speeds up to four times the speed of sound, about 3,000 miles an hour, have been dedicated at Aberdeen, Md., to the purposes of peace. The supersonic wind tunnels, one for bombs (shown on the front cover of this SCIENCE NEWS LETTER), the other for ballistics, are a part of the Army Ordnance Research and Development Center of the Aberdeen Proving Ground. Research work sneaked in before calibration of the bomb tunnel was completed saved the Army more than the cost of the entire installation by showing that a new 10,000-pound bomb, soon to go into production, was unstable. Other research at the wind tunnel has added 3,000 yards to the range of the 155-millimeter gun by changing the shape of the projectile.

Peacetime applications of the new wind tunnels are vast, reports Lt. Gen. L. G. Campbell, Jr., Chief of Army Ordnance. While the tunnels will be used in the remaining months of the war and for some time afterwards, for the development of new forms of bombs and rockets to improve accuracy, and to create guided missiles that may travel at extremely high speeds, they will also be available for nonmilitary research, Gen. Campbell believes. Within five years after the war, he predicts, 75% of the experiments carried out in the wind tunnels will be of a peacetime character. In addition to the Army research, the tunnels are now used by the Navy and the National Advisory Committee for Aeronautics.

The bomb tunnel and the ballistics tunnel are both contained in a new three-story brick building. The bomb tunnel is designed to produce air speeds up to 1.7 times the speed of sound, or about 1,300 miles an hour. When completed, the ballistics tunnel will provide air speeds of about 3,000 miles an hour. Both tunnels are a part of one closed circuit through which compressed air is forced by a five-unit power plant developing 14,000 horsepower.

At supersonic speeds, the size and shape of a nozzle determines the speed

attained. Nozzles are placed in the wind tunnel directly in front of the test section in which models to be examined are placed. In the bomb tunnel, this nozzle must be changed to attain different supersonic speeds. In the ballistics tunnel, a flexible throat nozzle is being installed so that air speeds may be changed by closing or opening it. This throat is made of long strips of quarter-inch steel plate, and the speed is changed by power-driven jacks which can close it to a one-inch aperture or open it to an 18-inch aperture. Thus it will be possible to reproduce speeds to which a projectile is exposed through its entire trajectory.

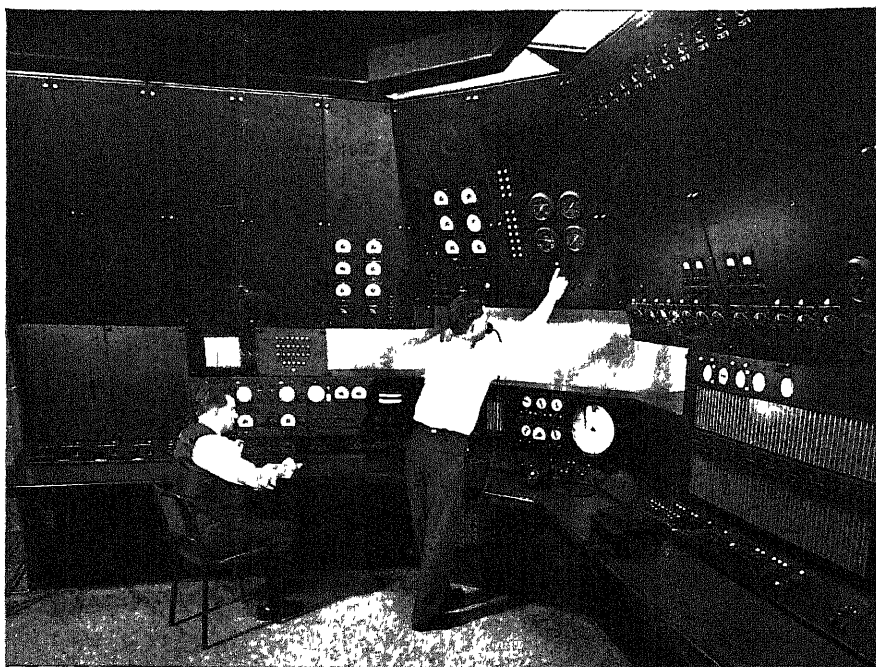
The test sections of the two tunnels are a little over a foot wide and a little under two feet high. In these sections on a special mounting rod are placed exact scale models, constructed of brass, of the item to be tested. These models can be nearly a foot long. Observation ports made of heavy glass, about a foot and

a half in diameter, permit observers to view the model at high speeds and to photograph the airflow pattern around the projectile. Temperature in the bomb tunnel during tests is about 100 degrees below zero Fahrenheit.

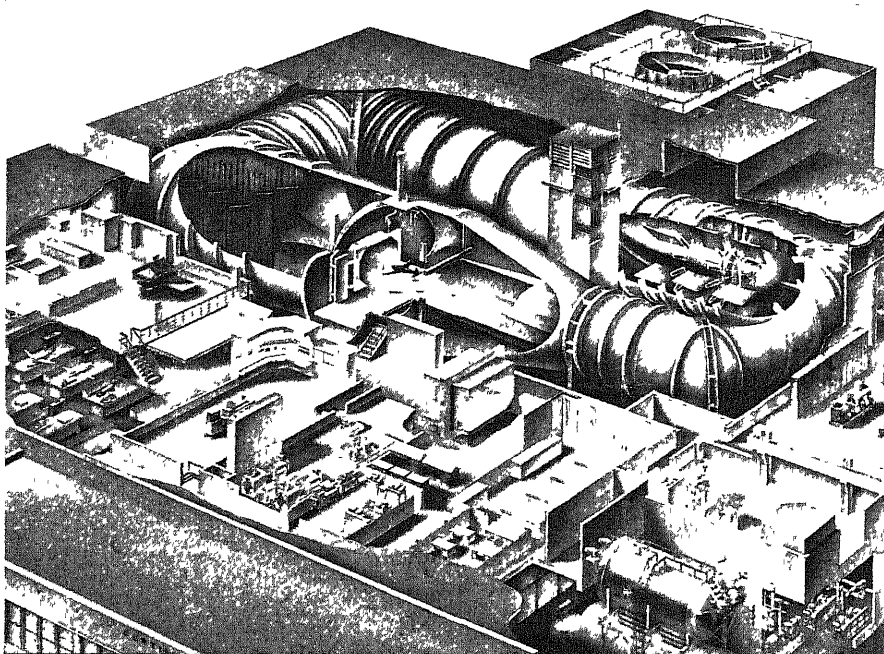
Instruments connected to the wind tunnel measure the three highly important factors in free flight of projectiles: lift, drag, and righting moment. Simply defined, lift is the force perpendicular to the projectile's path; drag is the retarding effect of the air; and righting moment is concerned with the true flight or stability as indicated by whether it yaws or tumbles.

In the wind tunnel the projectile is held still and air is blown past it. By the only other method used for checking on new designs, a ballistics range, the projectile has to be shot through the air and photographed in flight by high speed cameras.

The new wind tunnels were first suggested in 1940 to the Ordnance Department by Prof. Theodor von Karman of the California Institute of Technology who was a member of the scientific advisory committee of the ballistics research laboratory of the Ordnance Department. A board of the National Academy of Sciences with Dr. W. F. Durand, noted hydraulic and jet propulsion expert, as chairman, and made up of Dr. Hugh Dryden, of the National Bureau



REGULATES TUNNEL—Operation of the variable wind tunnel is regulated and observed by technicians manning this giant console, adjacent to the tunnel.



TESTS PLANES—Cutaway view of the giant new wind tunnel soon to be in operation at Buffalo which is capable of testing model airplanes at the lightening speed of jet propulsion at pressure conditions simulating 35,000 feet altitude. The tunnel contains an air volume of 210,000 cubic feet, equal to the cubic air volume of 16 six-room houses.

of Standards, Dr. F. R. Moulton, well-known astronomer, and Dr. Gano Dunn, electrical engineer, coordinated the development of the tunnel. A model tunnel was built at California Institute of Technology and this model was used for the basic design of the present tunnels. Construction took about one year. The wind tunnel laboratory is under the direction of Dr. Edwin P. Hubble, noted astronomer of the Mt. Wilson Observatory, on loan to the War Department for the duration. Research is supervised by Col. George G. Eddy, Director of the Ordnance Research and Development Center, who works directly with Maj. Gen. G. M. Barnes, Chief of the Research and Development Service of the Ordnance Department.

Science News Letter, May 26, 1945

PHYSICS

Wind-Tunnel Tests Speeds Up to 740 Miles an Hour

➤ A NEW \$2,500,000 variable-density wind tunnel, capable of testing model airplanes at the 740-mile-an-hour speed known as "speed-of-sound" range, has been revealed by G. W. Vaughan, president of the Curtiss-Wright Corporation. The wind tunnel, largest of its kind in

the nation, can be used to test jet-propelled airplane models with wing-spans up to 10 feet under atmospheric pressure conditions comparable to those found at 35,000 feet above the earth, about four pounds to the square inch.

Designed with the cooperation of the California Institute of Technology, the new Curtiss-Wright wind tunnel will enable engineers to test models of all types of planes, thus accomplishing in one place work which previously has been performed in three or four tunnels. This is made possible by the mammoth tunnel's extreme flexibility of testing range.

The operation of the tunnel is fundamentally simple. When engineers are ready to gather data on a plane, a model of the plane, exact to one thousandth of an inch, is installed on a test platform in the 8½ by 12 foot test chamber and air is set in motion by two 16-bladed, 22-foot diameter fans working in tandem. Wind may be blown to stimulate winds up to many times tornado speeds. Thus aerodynamic forces created are like those experienced by an actual plane in flight. By using a nozzle in front of the test chamber, air at high speed can be compressed further, creating a stronger blast.

At the control panel, an operator records the air load forces simultaneously by punching a button which causes the

measured forces to be computed on perforated cards. Data on the punched cards later are appraised to determine full-scale airplane characteristics, thus eliminating possible errors in design long before the actual construction of the plane.

The overall length of the tunnel is 178 feet. Its overall width is 81 feet. It stands 36 feet from the ground at its maximum height. A 115,000-volt power supply is needed for the tunnel for use with the 14,000-horsepower drive motors that turn the big fans. Employing four special compressors, air in the tunnel may be pumped to four times atmospheric pressure, or 60 pounds to the square inch. Three-quarter inch steel used in the building of the shell of the tunnel is similar to that used in the construction of a heavy U. S. destroyer.

Science News Letter, May 26, 1945

Chemical From Mushrooms For Treating Poison Ivy

➤ A CHEMICAL from mushrooms may in future become a remedy for ivy poisoning, Prof. Irwin W. Sizer and Clemens E. Prokesch, of Massachusetts Institute of Technology, report in *Science*.

The chemical is tyrosinase, an enzyme found not only in mushrooms but other plant and animal tissues. It is the one responsible for darkening of potatoes and bananas when left exposed to air.

One of the better methods of treating skin poison ivy, the scientists point out, involves oxidation of the poison with strong oxidants such as ferric chloride and potassium permanganate. Believing that the same results might be obtained with innocuous agents such as enzymes, the scientists tested the effects of tyrosinase.

In four of their numerous experiments, they put poison ivy plus tyrosinase on the skin of human volunteers for four hours. Another part of the skin was treated in the same way except that the tyrosinase had first been inactivated by boiling. The area treated with the active enzyme showed much less skin irritation than the control area treated with the inactivated tyrosinase.

"If successful results can be obtained in the future by applying the enzyme some time after the toxicant (poison ivy irritant) has reacted with the skin, even after erythema (reddening) has been produced," the scientists state, "then a new method of treating poison ivy dermatitis will be available."

Science News Letter, May 26, 1945

Cancer of the Kidneys Diagnosed by New Method

► **CANCER** of the kidneys, bladder, prostate and other organs of the urinary tract may be diagnosed by a simple method recently developed for diagnosing cancer of the uterus, Dr. George N. Papanicolaou and Dr. Victor F. Marshall of Cornell University Medical College and New York Hospital, report in *Science*, (May 18).

The method depends on the fact that cancers of the uterus and of the urinary tract shed superficial cells which can be obtained for examination almost as easily as if the cancers were located on the outside of the body.

Of 83 cases in which this diagnostic method was tried, 27 were reported as positive for cancer. Of these 27, clinical diagnosis was positive in 21.

The method is simple, easy for the patient and inexpensive. If further study shows it lives up to its present promise, it might be valuable, the doctors point out, in periodic health examinations such as those conducted in public health clinics for detecting early or unsuspected cancer. It should also be useful in cases when repeated examinations are necessary to clear up an obscure diagnosis or to follow results of operations or other treatment.

Science News Letter, May 26, 1945

PHYSICS-GENERAL SCIENCE

Astronomer Offers Theory Linking Mind and Matter

► **A THEORY** which offers new light on many phenomena hitherto not explained, such as the relationship between mind and matter and the connection between the will and muscular activity, has recently been published by Dr. Gustaf Stromberg of the Mt. Wilson Observatory staff. (*Journal of the Franklin Institute*)

Dr. Stromberg's article, entitled *The Autonomous Field*, is an outgrowth of ideas from Einstein's general theory of relativity and modern wave mechanics, concepts which are now included in our present theory of the atom. From the popular point of view, the most interesting feature of the autonomous field theory is that it is applicable not merely to inanimate objects such as stars and radiation, but to living tissues as well—in particular, to the actual development of an embryo within the human body.

Of special interest also is the fact that the theory is in striking agreement with experimental results obtained by Dr. H. S. Burr of the Yale Medical School on the oscillations of electric fields surrounding plants and animals.

It was the desire to understand the organization in the living world and the origin of consciousness which first gave impulse to Dr. Stromberg's study.

"The autonomous field theory is applicable to both the organic and inorganic world," Dr. Stromberg stated. "The novel idea introduced by Faraday more than a century ago, that fields have properties of their own, is thus vindicated by recent developments in physics and biology, and can serve as a starting point for a deeper understanding of nature, including the workings of the human mind."

Science News Letter, May 26, 1945

ENGINEERING-AERONAUTICS

Glass Fiber Blankets Absorb Sound in Planes

► **SOUND** insulation on multi-engined bombers is accomplished with blankets composed of down-like glass fibers as thin as five hundred-thousandths of an inch in diameter, reported Willis M. Rees and Robert B. Taylor of Fiberglas Research Laboratories at the meeting of the Society of Motion Picture Engineers. These blankets, weighing 2½ ounces to the square foot will be the basis for products that will meet the sound-control requirements of motion picture, television and radio industries after the war, they predicted.

Friction of pulsating air molecules against the walls of crevices in porous materials dissipates sound energy into heat, and it is in this way that most sound absorption is provided, Mr. Rees pointed out. Within limitations, the greater surface area provided by these crevice walls, the greater the sound absorption. There is a great increase in the total surface area of a pound of glass fiber as the fiber diameter decreases.

"Further research may demonstrate that acoustical values are functions of the fiber diameter and of the surface area of the fibers that make up the material," Mr. Rees stated.

He pointed out that glass fiber materials provide a group of non-burning products apparently subject to more complete control than has ever been possible in acoustical research, although there are not enough data at present on which to base scientific conclusions.

Science News Letter, May 26, 1945

ASTRONOMY

May 4 Meteoric Fireball Burst Near Chester, Pa.

► **THE FIREBALL** seen in the early morning hours of May 4 burst southwest of Philadelphia, probably near Chester, at a low altitude, preliminary study of nearly a hundred reports sent in by newspaper readers indicates to Dr. Charles P. Olivier, director of the Flower Observatory, who is president of the American Meteor Society.

Reports from housewives, workers on night shifts, invalids, policemen and others who were awake at 3:30 a.m. when the meteor plunged earthward were collected through the cooperation of newspapers publishing Science Service dispatches.

Science News Letter, May 26, 1945

CHEMISTRY

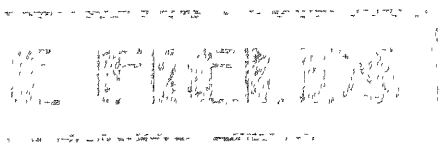
Diatomaceous Earth Used In Filtering Water

► **DIATOMACEOUS** earth will be used to filter water in all new purification units shipped to the armed forces in the Pacific as a result of tests conducted by the Engineer Board, Fort Belvoir, Va. The new filter, experiments showed, not only removes the cysts of amoebic dysentery but also filters out the blood flukes prevalent in Philippine waters.

Another improvement featured by the new purification units is the glass-fiber tank which, coated with Buna S rubber, replaces the old canvas type. It will not mildew and is little affected by climatic changes. Whereas the canvas tank loses a considerable quantity of water before the fibers swell to waterproof proportions, the new type is waterproof and fills at once.

It is presumed that U. S. troops going directly to the Pacific field from Europe will take their old-style purification units with them, and plans are being made to equip them with the newer type. The procurement division has ordered several thousand of the new units of 15 and 50 gallons per minute capacity. There are now in the field about 20,000 of the small, half-gallon per minute units.

Science News Letter, May 26, 1945



AERONAUTICS

Army's C-82 Cruises At 200-Miles-an-Hour

► THE ARMY'S newest twin-engine air cargo transport, the C-82 "Packet," can cruise through the air at 200 miles an hour, 20 miles an hour faster than was expected, flight tests at Hagerstown, Md., and Miami, Fla., reveal. It can fly as high as 22,000 feet on two engines, or to 8,000 feet on a single engine with a full load. The plane could fly non-stop from New York to Los Angeles and part of the way back if necessary, since it has a maximum range of 4,000 miles.

Powered by two Pratt and Whitney 2,100 horsepower engines, the Packet can carry 18,000 pounds of cargo on a 500-mile trip or 13,000 pounds on a trip of 1,500 miles. It is expected that 1,500 miles will be about the longest single hop that cargo planes will be called on to make in practical use on overland air routes.

Built by Fairchild Aircraft, the C-82 shoots up at a steep slant in take-off. After a run of 800 feet from a dead stop, it clears the ground and gains more than 50 feet of altitude in the next 1,800 feet.

Science News Letter, May 26, 1945

CHEMISTRY

Study of Biogeochemistry Undertaken by Museum

► A THREE-year preliminary survey of biogeochemistry has been initiated under the auspices of the American Museum of Natural History. In charge of the work will be Prof. G. Evelyn Hutchinson of Yale University; associated with him are Prof. Paul F. Kerr of Columbia University, Prof. W. A. Albrecht of the University of Missouri, Dr. Martin D. Kamen of the University of California, and Prof. Edward J. Conway of University College, Dublin.

Biogeochemistry is the investigation of the effects of earth chemicals of various regions on the life of plants, animals and human beings that inhabit them. Everyone has heard of such isolated instances as prevalence of goiter in areas lacking in iodine, of mottled teeth where there is too much fluorine in the water, of sick and crippled farm animals in regions

where the soil contains an excess of selenium. Oceanographers make chemical analyses of water from all the earth's oceans and seas as a matter of routine; but with the exception of pioneer work done some time ago in Russia by the late W. I. Vernadsky nothing comparable has been done for the chemistry of the land areas.

The present survey will undertake to assemble and evaluate all obtainable existing data, as well as to initiate new researches in fields where results appear promising.

Science News Letter, May 26, 1945

PHOTOGRAPHY

Simple Paint-brush Method For Applying Emulsions

► A NEW simple paintbrush method of applying photographic gelatin-silver-halide emulsions to metal sheets, so that patterns can be photographed on the metal to guide workers in building airplanes, has been described by Faurest Davis of Ansco. Although there are several methods now in use, including silk screen and stencil devices, the photographic method of transferring engineering drawings to the work itself by photographic means has proved highly satisfactory in a number of aircraft plants.

The process described by Mr. Davis begins with heating a bulk emulsion gel to a temperature of 110 degrees Fahrenheit in a double boiler or water jacket. These and other operations must be carried out in a darkroom, under proper safelight conditions. A homogenizer or stirrer with stainless steel fittings, running at 5,000 revolutions a minute, is next used to blend glycol-monobutyl-ether with the liquefied emulsion. The substance acts as a gelatin leveling agent. After about two minutes of stirring, considerable foaming occurs and a few drops of another substance are added to prevent air bubbles. The mixture is then ready to be spread on the metal. Materials to be sensitized are usually coated with a flat white lacquer free of sulfides and other contaminants, and heated to about 100 degrees Fahrenheit to allow the emulsion to level out before becoming stiff.

The warm, liquefied emulsion is applied with a soft paintbrush. Up to 1500 square feet can be covered with a gallon of the mixture. This brings the cost of the sensitizing material down to about one cent a square foot.

Science News Letter, May 26, 1945

CHEMISTRY

X-rays Now Used to Make Chemical Analysis

► CHEMICAL analysis of gases, liquids and solids by shooting a beam of X-rays through them, is a new and rapid means of identifying the chemical elements in the material, developed by Dr. Herman A. Liebhafsky and Dr. E. H. Winslow in the General Electric research laboratory. Another scientist in the laboratory, H. Millard Smith, has found a practical way of measuring the X-ray absorption, on which the new method depends, by a photoelectric X-ray intensity meter.

X-rays are intimately related to the inner atom, so they furnish a means of counting the numbers and indicating the kinds of atoms by which they are absorbed. The count is unaffected by whether the atoms are free or have combined to form molecules of any sort whatsoever. An oxygen atom, Dr. Liebhafsky explains, will have the same absorption for X-rays, whether it is free or in the oxygen molecule, or in liquid water, ice or steam, or in sugar or in sand.

In the X-ray absorption method developed by Mr. Smith, the invisible rays fall on fluorescent material which becomes luminous where they strike. This material, called a phosphor, is painted on the glass envelope of a phototube of the multiplier type.

With such a tube the light from the phosphor falls first on a sensitized surface within the tube, and electrons are emitted from it. These electrons are multiplied by electronic amplifiers, producing a current that can be measured.

Science News Letter, May 26, 1945

CHEMISTRY

Fumes Endanger Health In Silver Soldering

► FUMES given off in silver soldering contained such a high concentration of cadmium that exhaust ventilation was installed in a Kansas City silver manufacturing plant to protect the health of the workers by collecting the fumes at their source.

Analysis of a solder sample revealed it was 18% cadmium, while further investigation showed that silver solders sometimes contain as high as 70% cadmium. The plant laboratory, upon recommendation of the Industrial Hygiene Service, is trying to develop a satisfactory solder not containing cadmium.

Science News Letter, May 26, 1945

ASTRONOMY

Jupiter, Evening Planet

With the arrival of June, it is the only planet remaining in the evening sky. Saturn sets too soon after the sun to be seen easily.

By JAMES STOKLEY

► WITH THE ARRIVAL of June, only one planet remains in the evening sky. This is Jupiter, appearing in the southwest in the constellation of Leo, the lion. As it is brighter than any other star or planet (minus 1.6 in the scale used by the astronomer), one has little difficulty in locating it. Its position is indicated on the accompanying maps, which show the appearance of the sky at 11 00 p. m., your own kind of war time, on June 1, and an hour earlier on the 15th. Similarly they would show the appearance at 9:00 p. m. at the end of June, only then the sky will hardly be dark enough to show the stars.

Brightest of the stars now seen (and which, unlike planets, shine by their own light like our nearest star, the sun) is Vega, in Lyra, the lyre. This is in the northeast. Just below Lyra is Cygnus, the swan, with first magnitude Deneb, though its low position at this time makes it seem fainter. This is the reason that its symbol on the maps is that for the second magnitude. The same is true of the star shown just above the northern horizon—Capella, in Auriga, the charioteer. Actually, this is brighter than any of the stars shown, except Vega, and when we see it high overhead on winter evenings we can fully appreciate it. But when it is so low, its light has to pass through a great thickness of the earth's layer of atmosphere and apparently it drops to third magnitude. To the left of Auriga is part of Gemini, the twins, in which we see Pollux, likewise fainter than normal.

Arcturus in South

High in the south is the bright star Arcturus, in Bootes, the bear driver, and below it is Spica, in Virgo, the virgin. Next to this group, below and toward the left, is Libra, the scales, in which there are no bright stars. But next to Libra we come to part of Scorpius, the scorpion, with first magnitude Antares, red in color, which will be so prominent in the southern evening sky during the coming summer months.

Just below Libra are parts of the constellation of Lupus, the wolf, and Centaurus, the centaur. The latter is the one in which alpha Centauri, nearest star to the earth (except the sun) is located. In this age it does not rise for people in most parts of the United States. It is visible, however, from the southernmost parts of Florida and Texas.

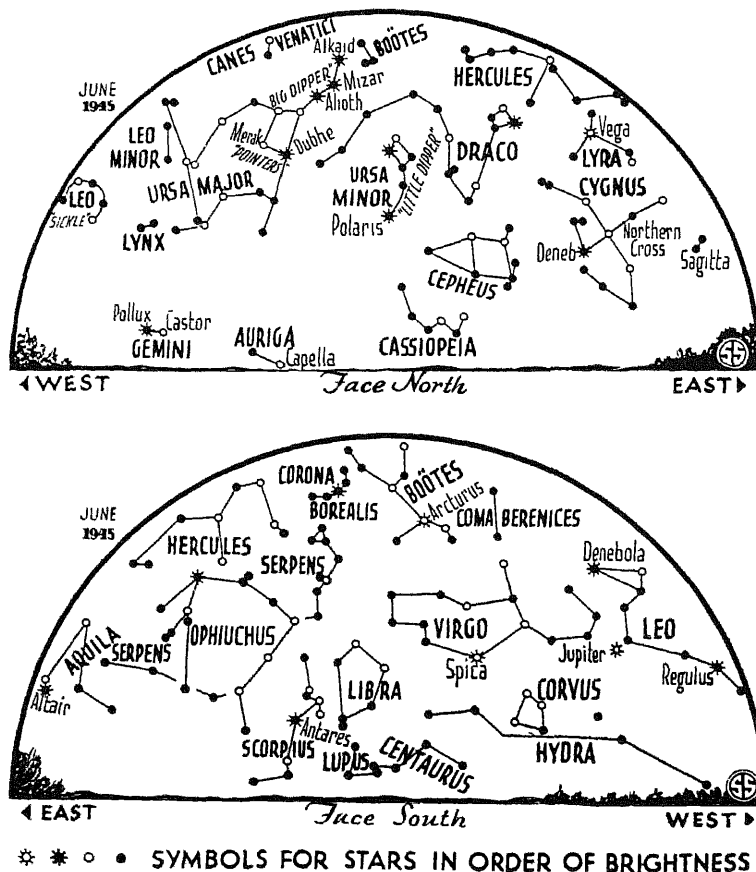
There are two other first magnitude stars (also indicated by second magnitude symbols because of their lowness) shown on the maps. One is Regulus, in Leo, the lion, the group in which Jupiter appears. This is in the west. Directly opposite is Altair, in Aquila, the eagle.

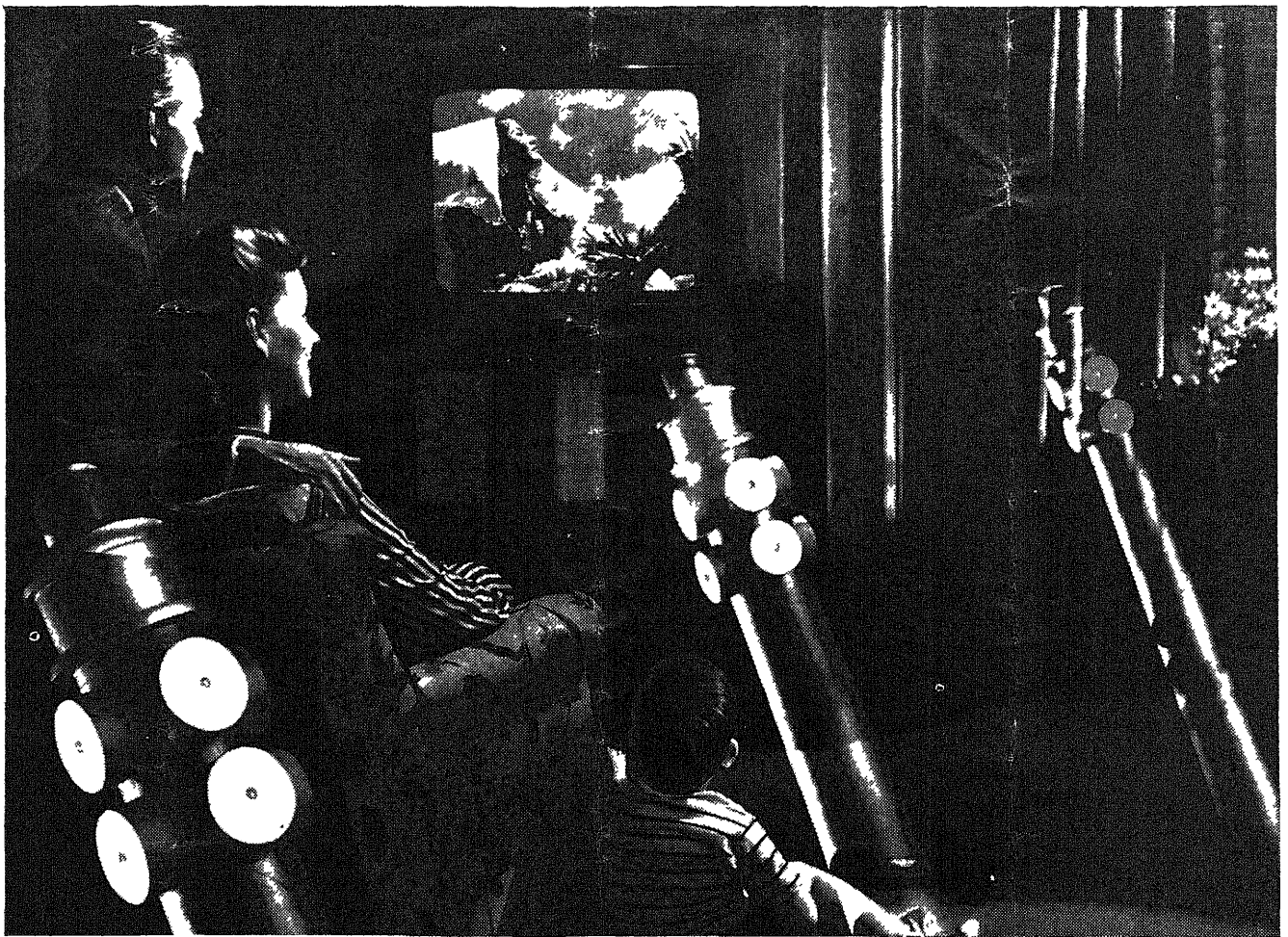
One welcome astronomical event of June is the summer solstice, which occurs on June 21 at 2 52 p. m. EWT. Then the sun reaches its farthest north position in the sky and, for us in the

northern hemisphere, summer begins. In the southern hemisphere, on the contrary, this marks the start of winter.

Though Jupiter is the only planet well placed for evening visibility in June, Saturn is also in the evening sky but sets too soon after the sun to be seen easily. It is in Gemini, the twins, below Castor and Pollux. On June 11, there will be an occultation of Saturn, with the moon passing in front of it and hiding it for about an hour. This will occur during the day, however, and will not be visible. This is also true, though for a different reason, of a partial eclipse of the moon which will occur June 25, as the moon partly enters the shadow of the earth. It happens while the moon is below the horizon for this part of the world, but it will be visible from the Pacific, Indian and Antarctic Oceans, Asia, Australia and southeast Africa.

Rising in the east well before sunrise, and shining there even more brilliantly than Jupiter, is Venus, which was so brilliant in the evening sky until a few





RCA radio-relay towers—like those phantomed above—will leap the hurdle of *distance* in post-war television.

Coast-to-Coast Television...through "Radio-Relay"

For a long time it looked as though post-war television might be confined to local stations. Only persons within a fifty-mile radius of New York, for example, would see the important television broadcasts from NBC's pioneer station WNBT, atop the Empire State Building.

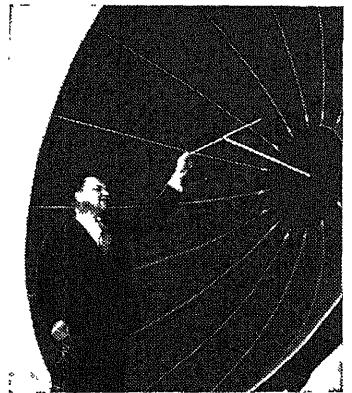
That was because the ultra short waves that carry television do not bend with the curvature of the earth. They go in a straight line out to the horizon—and then keep on going into the sky.

But today, television's big handicap of short range has been completely overcome—by RCA scientists and engineers.

The *radio-relay* was developed—a tower that "bounces" television programs to the

next tower 30 to 50 miles away. Through a network of these automatic, unattended, radio-relays, coast-to-coast television is made practical.

This is but one more example of how RCA research constantly "makes things better." Such research is reflected in *all* RCA products. And when you buy a television set, or radio-phonograph, or anything made by RCA, you enjoy a unique pride of ownership. For if it's an RCA you can be sure it is one of the finest instruments of its kind that science has achieved.



C. W. Hansell, RCA specialist in transmitters and relays, is shown here with a radio-relay reflector that can "bounce" radio messages, radiophotos and Frequency Modulation programs at the same time that it relays television!

RADIO CORPORATION of AMERICA

PIONEERS IN PROGRESS



Do You Know?

The *cashew nut* and poison ivy belong to the same plant family.

Meat from exercised *cattle* is more tender than that from more close-stalled animals.

Gallium, a little known chemical element, is 150 times as abundant as silver.

Over 20 different *chemicals* and materials are used in the ordinary kitchen match.

The word *protein* was coined about 1839 by Mulder, who lived from 1802 to 1880.

Formerly almost all of the *cigarette paper* for U. S. smokes was imported from France; now it is made in America.

Piston rings of gray cast iron have been replaced in many war engines by stronger ones, alloyed of iron, nickel, chromium and molybdenum.

Because of incessant *rains* during last fall, that prevented plowing and seeding, France expects a short wheat crop this year.

The production of *silk* was a closely guarded secret in China for many centuries; in the third century A.D. the Koreans brought the art to Japan.

U. S. Forest Service "*smoke-jumpers*" and their flame-fighting tools are parachuted to forest fires in regions inaccessible by roads.

Tarnish is removed from silverware by placing the silver in an aluminum pan and heating in a mild solution of soda; electrolytic action carries the tarnish to the aluminum, darkening it somewhat but leaving silver bright.

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months ago. And near it is the planet Mars, still faint, but beginning to brighten. Early in June Mars and Venus approach to within a distance about ten times the moon's diameter, but then they draw apart again.

From a correspondent in Boston comes a question about magnitudes of stars and planets. The astronomer's system, with its minus and plus magnitudes, may seem rather complicated, but one need only consider the whole series of numbers, whether negative or positive, as continuous, with two one less than three, one as one less than two, zero one less than one, minus one one less than zero, minus two one unit less than minus one, and so on. And the lower the number, the brighter is the object. Magnitude six is brighter than magnitude seven, and so also, magnitude minus two is brighter than magnitude minus one.

Goes Back 1700 Years

The system goes back some 1700 years, to the Alexandrian astronomer Ptolemy, who wrote a famous book on astronomy, called the *Almagest*, in which appeared the first catalog of stars, giving their relative brightnesses. Ptolemy divided them into six classes, or "magnitudes." The brightest he put in the first magnitude, while in the sixth he placed those which could just be seen. After the telescope came into use in the seventeenth century, still fainter stars were observed, and so the system was extended. With the largest telescope today, the 100-inch at Mt. Wilson, it is possible to see stars down to the 19th magnitude and to photograph them as faint as the 22d

In 1830 Sir John Herschel, in England, found that an average star of the first magnitude was just about a hundred times as bright as the average sixth magnitude star, and that the same ratio applied even down through those too faint to be seen with the naked eye. To provide a uniform and scientific system, another English astronomer, named Pogson, proposed in 1850 that a fixed scale of stellar magnitudes be adopted, with each magnitude just 2.512 times the brightness of the next fainter class. This figure was selected because this ratio makes a difference of five magnitudes exactly 100 times the difference in brilliance. Lists of stars usually give their magnitude to the nearest tenth, which is the least that an expert can distinguish, although the "electric eye," or photo-electric cell, can detect variations of a hundredth of a magnitude.

Ptolemy grouped all the brightest stars

together as first magnitude. Sirius is about fifteen times, or three magnitudes as bright as Regulus, though both were placed in this class. Therefore, when the magnitude scale was placed on a scientific basis, it was necessary to provide places for the brighter stars, and so the scale was extended downwards, to zero and to negative magnitudes. But even here the same Pogson's ratio holds; i. e., minus one magnitude represents a star 2.512 times as bright as magnitude zero, minus three 2.512 times as bright as minus two, and so on. Sirius is thus placed at magnitude minus 1.6; Venus, as seen in the morning sky this month, minus 4; the full moon minus 12.5 and the sun minus 26.7.

Celestial Time Table for June

June	EWT	
3	9:15 a.m.	Moon in last quarter
6	7:51 a.m.	Moon passes Mars
	5:17 p.m.	Moon passes Venus
7	4:00 p.m.	Moon nearest, distance 225,900 miles
10	12:26 a.m.	New moon
11	2:02 p.m.	Moon passes Saturn
16	5:22 p.m.	Moon passes Jupiter
19	1:00 p.m.	Moon farthest, distance 251,400 miles
21	2:52 p.m.	Sun farthest north, beginning of summer in northern hemisphere
24	3:00 p.m.	Venus farthest west of sun
25	11:08 a.m.	Full moon, partial eclipse of moon visible in eastern hemisphere

Subtract one hour for CWT, two hours for MWT, and three for PWT.

Science News Letter, May 26, 1945

AERONAUTICS

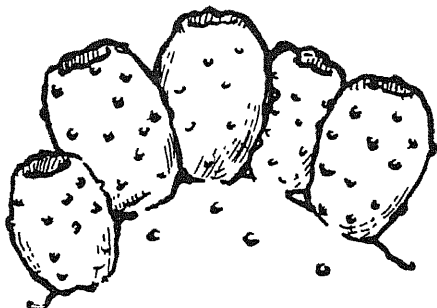
Superfortress Gets Fighter-Plane Engines

➤ LIQUID-COOLED in-line engines of the type common to such fighter planes as the P-38, P-40 and P-51 now power an experimental B-29 Superfortress, replacing the radial aircooled engines with which the plane is usually equipped. The object of the experiment was to give additional flight data and experience in the use of in-line liquid-cooled engines as applied to heavy bombers, the Air Technical Service Command at Wright Field reports.

Cooperating with the Air Forces in the successful test was the Allison Division of General Motors, manufacturers of the engine. Prior experience in the use of the liquid-cooled engine in heavy airplanes had been gained in work with the modification of the B-19, in which similar engines were installed.

With the new engines the modified B-29, known as the XB-39, develops a total of 10,400 horsepower from its four engines.

Science News Letter, May 26, 1945



Spiny Globe-Trotter

➤ THE CACTUS FAMILY as a whole is pretty strictly American, and most of its 1500-odd species have remained in their native hemisphere. But a few kinds of the oval-jointed prickly-pear cactus have penetrated into practically every part of the world where the climate suits them. They have made themselves so thoroughly at home that in most places where they now grow they are regarded as part of the native vegetation.

In most places the prickly-pear cactus was introduced as a botanical curiosity for rock gardens, or possibly for its edible fruits. Once established, it has shown a mobility in migration astonishing in a plant not equipped with any special means of dispersal. Where it has been considered useful or ornamental, the cactus has of course had plenty of willing human aid; but it has also managed to spread over wide areas of semi-arid land where man-assisted propagation is out of the question.

Lack of special dispersal means may have been largely offset by the high survival ability of the plant. One of its leathery-skinned, succulent joints, chance-snagged on the wool of a sheep, might ride only a few hundred yards or at most a mile or so. But where it fell off it would not perish like the twig or leaf of an ordinary plant; it would strike root and grow up into a healthy, bristly cactus bush. The role of birds, rodents and other animals in carrying cactus seeds is not at all well known, but it must be of some significance.

In some of the lands to which it has been carried, prickly-pear has become a major pest. Most spectacular, of course, was the case of Australia, where the

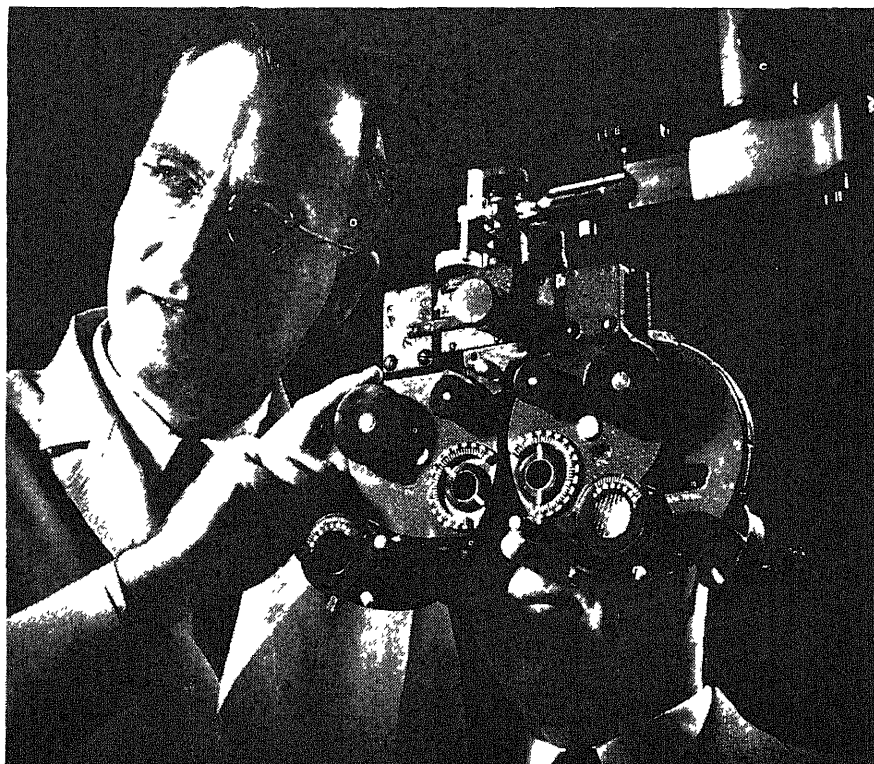
plant was rendering millions of acres of the best grazing and farm lands unusable. Importation of the cactus moth as a counter-pest came just in the nick of time. On the other hand, cactus is a prized hedge plant on Madagascar and one or two other tropical islands where cattle are numerous and have to be kept out of yards and gardens.

Prickly-pear cactus demonstrated its capacities as an emigrant plant very early. It appeared in the Mediterranean basin very soon after the discovery of America, and in a few decades was all over the

lands on both shores. It has become so common in Palestine, for example, that one of the most common of artists' anachronisms is to paint it into Biblical scenes as part of the landscape of 2,000 or more years ago.

Science News Letter, May 26, 1945

On a quality basis, juice from small oranges averages better in flavor than juice from large fruit, has more solids, is richer and sweeter, and has a higher vitamin C value.



A Matter of Life and Death



During 1945, nearly a hundred thousand Americans will lose their lives—*victims of home-front accidents.*

Three times that many will suffer permanent disability. And the cause for many of these accidents will be faulty vision, or vision unsuited to its tasks.

You might never think of an eyesight examination as a matter of life and death. But the things you do at work, at home, on the farm, or in traffic—the hazards of everyday living—require efficient, alert eyesight. Keen vision is safe vision; reduction of accidents is a matter of national urgency.

The only way you can be sure about your

vision is to consult an ophthalmologist or optometrist for a complete visual analysis. If correction is called for, you can depend on the professional and technical skills of the optometrist or optician to provide modern attractive eyewear.

Play safe—be sure your vision is right. Bausch & Lomb Optical Co., Rochester 2, New York.

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PUBLIC HEALTH

May Not Be T. B.

➤ **MANY MEN** rejected for the armed forces because of healed tuberculosis may be eligible for such service. They probably did not have tuberculosis, even though X-ray pictures of their lungs showed areas of calcification.

This is one of two medical surprises turned up in a U. S. Public Health Service Study of some 3,000 student nurses. The study is reported by Dr. Carroll E. Palmer in *Public Health Reports* (May 11).

Calcification of the lungs is generally taken as evidence of healed tuberculosis. It may also be due to another disease, histoplasmosis, Dr. Palmer's report shows.

This disease comes from a fungus called *Histoplasma capsulatum*. It has been known as a rare and always fatal ailment. It may, however, be a very common infection, occurring in a form so mild as not even to be recognized as a sickness. This is the second surprise turned up in the study reported by Dr. Palmer.

Starting point for the study was a growing doubt that lung calcification showing in X-ray pictures always was due to healed tuberculosis. Part of the doubt came from the geographical distribution of the X-ray findings. A lot more people with lung calcification were found in one part of the country than in

another. Selective Service examinations, for example, showed a variation from 6% in Oregon to 28% in Kentucky.

The geographic distribution of people with lung calcification, moreover, did not correspond with the distribution of tuberculosis throughout the country.

The idea that lung calcification always meant healed tuberculosis became even more doubtful when it was found that large numbers of those with calcified spots on their lungs had negative tuberculin reactions. A negative tuberculin reaction means that the person has not been infected with tuberculosis. Consequently the calcified spots on his lungs must have had some other cause.

So when the Public Health Service with the National Tuberculosis Association started making chest X-rays and tuberculin tests on some 10,000 student nurses throughout the country, Dr. Palmer took the opportunity to investigate this question of a nontuberculous origin of the lung calcification.

Clues from other scientific studies pointed to histoplasmosis and to San Joaquin Valley Fever, another fungus infection with the scientific name of coccidioidomycosis. Skin tests something like the tuberculin test were made for these two infections.

San Joaquin Valley Fever was soon ruled out. Only a very few student nurses gave a positive test for this and they had lived or traveled in the Southwest where it is prevalent.

With the histoplasmosis test, the story was different. Among student nurses with a positive reaction to this test, but not to tuberculin, 31.1% had lung calcification. Among those reacting positively to tuberculin but not to histoplasmin, 10.4% had lung calcification. In the large group of more than 2,000 who had negative reactions to both tests, only 1.2% showed lung calcification.

Wide geographic differences were also found. Among nurses who had lived almost all their lives in Minnesota, less than 5% showed any reaction to histoplasmosis, while more than 60% of those in Missouri were sensitive to this substance.

If, as seems likely, a positive skin test with histoplasmin means the person has been infected with the fungus or a related organism, the studies show that the infection in mild form is very com-

mon in certain states. They also show that histoplasmosis is probably the cause of a very high proportion of lung calcifications seen in chest X-rays of persons with negative tuberculin reactions.

The states where lung calcification is a frequent finding and where histoplasmosis is probably common in mild form are: Kentucky, Arkansas, Illinois, Indiana, Iowa, Maryland, Mississippi, Missouri, North Carolina, Ohio, Tennessee, Virginia and West Virginia.

Science News Letter, May 26, 1945

GENERAL SCIENCE

Baku on Caspian Sea Now Has Science Academy

➤ **THE AZERBAIJAN** Academy of Sciences at Baku, the oil center, has been added to the roster of the world's scientific bodies. Geologists, physicists, biologists and other scientists and technologists are now at work exploring the raw materials and working out new methods and processes for the industries and agriculture of this republic of the U.S.S.R. which lies on the eastern side of the Caucasian Mountains.

Chromite, the ore of chromium needed for steel alloying, as well as ores of cobalt, barium and aluminum have been discovered. Cotton yields have been increased.

The autonomous academy replaces a branch of the U.S.S.R. Academy and the new organization starts with 15 academicians under the presidency of Dr. M. Markazimov.

Science News Letter, May 26, 1945

Anaxagoras, who lived from 500 to 428 B.C., was banished from Athens for teaching that the sun was a red-hot stone, and the moon simply another earth that does not shine by its own light.



WYOMING

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Books of the Week

► THE PROBLEM of "Lebensraum" may have been solved for Germany by World War II—at least it served to cut down the population there to a considerable extent. But in many other parts of the world, the increasing number of men, women and children who need food, clothing, education and the various freedoms, combined with the decreasing acreage of good farm land which is being rapidly lost through erosion and waste pose a gigantic and urgent problem. The authors of **POPULATION ROADS TO PEACE OR WAR**, Guy Irving Burch and Elmer Pendell, (Population Reference Bureau, paper, \$1., cloth, \$2.), believe it to be the principal problem of those who will sit around the peace table. Unless a reasonable and effective solution is found, they believe, there can be no permanent peace. They urge vigorous measures of education for planned parenthood, migration restrictions for any country that fails to control its own population increase, sterilization laws and more strict marriage laws.

Science News Letter, May 26, 1945

► ALL AVIATION ACTIVITIES of the calendar year 1943 and as recent as May, 1944, are found in digest form in the new illustrated **JANE'S ALL THE WORLD'S AIRCRAFT 1943-1944**, compiled by Leonard Bridgman (Macmillan, \$19). Although the volume is complete and detailed on military and civil aviation as well as data on aviation engines, it is regrettable that it does not contain such up-to-date airplanes as the B-29 Superfortress, or P-61 Black Widow. It is, however, a valuable reference and gives details on foreign aircraft not readily available elsewhere. The current issue of this annual contains nearly 700 photographs as well as charts and drawings.

Science News Letter, May 26, 1945

Just Off the Press

THE AUTOBIOGRAPHY OF SCIENCE—Forest Ray Moulton and Justus J. Schifferes, eds. —Doubleday, 666 p., \$4

CAREERS IN SCIENCE—Philip Pollack—Dutton, 222 p., illus., \$2.75.

THE COMING AGE OF ROCKET POWER—G. Edward Pendray—Harper, 244 p., illus., \$3.50.

THE DIETARY OF HEALTH AND DISEASE—Gertrude I. Thomas—Lea, 308 p., illus., \$3.50, 4th ed.

ESSENTIALS OF BODY MECHANICS IN HEALTH AND DISEASE—Joel E. Goldthwait and others—Lippincott, 337 p., illus., \$5., 4th ed.

THE FARMER'S SHOP BOOK—Louis M. Roehl—Bruce Pub., 446 p., illus., \$2.48, 8th ed.

MAINSPRINGS OF CIVILIZATION—Ellsworth Huntington—Wiley, 660 p., illus., \$4.75.

THE MALE HORMONE—Paul de Kruif—Harcourt, 243 p., \$2.50. Enthusiastic story about the chemical identification and synthesis of the male sex hormone, and its uses, both present and potential. Of course, consult your doctor.

PRACTICAL SLIDE RULE MANUAL—Jack Klock—Edwards Brothers, Inc., 36 p., paper, illus., \$1.

PRE-INCAIC HUAMACHUCO, Survey and Excavations in the Region of Huamachuco and Cajabamba—Theodore D. McCown—Univ. of Calif. Press, 399 p., paper, illus., \$2.

PRINCIPLES OF FIREARMS—Charles E. Balleisen—Wiley, 146 p., illus., \$2.50

WORLD GRAIN REVIEW AND OUTLOOK, 1945—Helen C. Farnsworth and V. P. Timoshenko—Food Research Inst., Stanford Univ., 319 p., illus., \$3

Science News Letter, May 26, 1945

MEDICINE

Yellow Fever Found in Wild Animal in Brazil

► YELLOW FEVER is a disease that most of us need not worry about, though a couple of generations ago the very word was terrifying. It is a disease that our health officials worry about because they know that the mosquitoes which spread it still exist in the United States. So long as we do not have any yellow fever patients from whom the mosquitoes can pick up and spread the germs, we can remain free from the danger of this disease. With people flying all around the world as they do these days, however, it takes constant watching at our borders to make sure no one comes in with unsuspected yellow fever. Mosquitoes themselves must also be watched for, since otherwise infected ones could come in on a plane and escape to cause damage.

The fight against yellow fever is going on even more actively in those regions of Africa and South America where the disease still exists. Latest word from this front concerns a sick monkey, a marmoset, trapped at Ilheus, in Brazil, by scientists of the Rockefeller Foundation's International Health Division. This animal had in its blood the virus of yellow fever, from which it soon died.

This is the first time in any country that a wild animal has been picked up in its natural habitat suffering from yellow fever. The finding lends support to the theory that yellow fever is "primarily a disease of jungle animals transmitted by jungle mosquitoes."

Those who must travel to yellow fever regions can be protected against the disease by a vaccine. The rest of us depend for protection on the activities of our health authorities and of scientists who are still working to learn more about yellow fever in the hope of perhaps eradicating it even from its jungle lair.

Science News Letter, May 26, 1945



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NUCLEAR PHYSICS AND BIOLOGY: by Ernest O. Lawrence

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❁ **MICROPHONE** for use in noisy locations transmits only the message. It looks like the ordinary instrument, but has two vertical slots on its sides through which the extraneous noises enter and strike opposite sides of the diaphragm at the same time, thus cancelling each other. A front slot admits the voice.

Science News Letter, May 26, 1945

❁ **METAL-COATED** plastic buttons, insignia, and automobile trimmings have a thin protective layer of metal applied evenly by the electroplating process. The finished product looks like metal but is lighter in weight and cheaper to produce.

Science News Letter, May 26, 1945

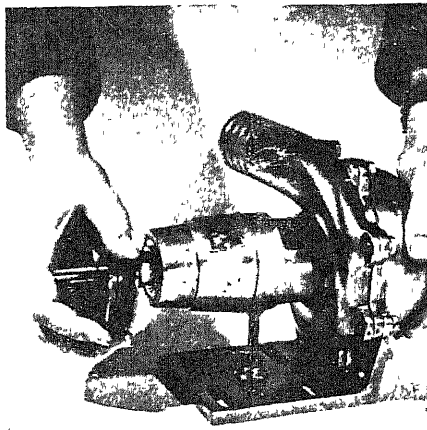
❁ **IMPROVED LUBRICANT** for drills used in drilling metals is a heavy material with a paraffin wax base and looks like shoe polish. Conveniently packaged, it is easy to apply and helps provide maximum life for the cutting tool without distorting the hole.

Science News Letter, May 26, 1945

❁ **AIR-COOLED flatiron**, in which the outside surface, except the base or sole-plate, is kept cool even in continuous use, has air intakes around the edge of the sole. Two inclined air-chutes along the inner sides of the dome-shaped top, with escape slots over the iron's heel, permit air circulation.

Science News Letter, May 26, 1945

❁ **MIDGET PUMP** for marine engines, shown in the picture, weighs only 22 pounds but will deliver 250 gallons



of water a minute and requires but one horsepower to operate. Based on the principle of the Archimedes screw similar to the worm in the familiar meat grinder, it has two screws with a step between.

Science News Letter, May 26, 1945

❁ **SPECIAL CONTAINER**, to fly blood from America to battlefronts, is a box less than two feet on each side. Made of kraft fiberboard, it is covered on both sides with aluminum foil and fastened to a balsa base. It holds 19 pounds of ice, which keeps 24 pints of blood below 54 degrees for 60 hours.

Science News Letter, May 26, 1945

❁ **SAFETY CLASP** pin, to replace ordinary safety pins, has flat upper and lower jaws joined at one end by a resilient spring between which is slipped the material to be held together. The pin is

mounted on the upper jaw in such a position that it cannot pick the flesh.

Science News Letter, May 26, 1945

❁ **MUSICAL** wind instruments and horns of a new type, which practically avoid the use of pipes and tubes, have in their interior construction covered channels or grooves forming a number of ducts alternately directed in substantially opposite directions. They are made of metals or plastics.

Science News Letter, May 26, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 260

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Question Box

AERONAUTICS

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What kind of engines are being tried on experimental B-29's? p. 332.

ANTHROPOLOGY

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What famous comet is appearing this year right on schedule? p. 325.

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ORDNANCE

How is it possible to produce speeds up to 3,000 miles-an-hour? p. 326.

PUBLIC HEALTH

What else besides T.B. may calcification of the lungs signify? p. 334.

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 2, 1945



Saved By Science
See Page 346

A SCIENCE SERVICE PUBLICATION

MEDICINE

Type Early for Rh

Must be done before the first transfusion is given, British scientists warn. Otherwise transfused blood makes test unreliable.

► BLOOD typing to see whether a patient has Rh negative blood, making repeated transfusions with Rh positive blood hazardous or even fatal, must be done before the first transfusions in order to give reliable results, British medical scientists warn in the *British Medical Journal*; (April 28), which recently reached the United States.

The tragic case of a woman who received ten transfusions, most of which were from donors with Rh positive blood, before it was discovered that she had Rh negative blood is described by Drs. R. Drummond, G. L. Taylor and J. T. Rice Edwards. In the meantime she had built up extremely potent antibodies to destroy the Rh positive blood given her. The report reached the *Journal* coincidentally with the sad news of the untimely death of Dr. Taylor, one of the pioneer researchers on the Rh blood factor.

The woman came to the doctor's attention suffering from a disease of the lymph glands which necessitated transfusions. She had no apparent ill effects from the first two transfusions. It was after the third that she had trouble and her blood was then typed for Rh. Although her blood was Rh negative, the tests at that time indicated that she was Rh positive, the deceptive results being due to the large quantity of transfused Rh positive blood.

When they later found out that the woman's blood was Rh negative, the physicians were puzzled that there were no more serious symptoms as a result of the Rh positive transfusions. Except for the difficulty with the third transfusion, the first six transfusions showed no obvious ill effects. The symptoms during the seventh were not especially severe. Nothing happened during the eighth and ninth transfusions although bad symptoms did develop later. And yet in the ninth transfusion just about a quart of red blood cells were given—donated by four Rh positive donors;

The scientists believe that the patient withstood this experience because of the fact that the blood was transfused by the slow drip method, which lessens the severity of reactions when they occur.

Extremely potent antibodies, destructive of Rh positive blood cells, were built up in the patient's blood. At one time

after the tenth transfusion, her blood was destructive of Rh positive cells when it was diluted to one part in 1,024,000. When a dilution of one part in 64 or one part in 128 is still effective, the agglutinins are usually considered to be very potent.

Fourteen more transfusions were given the patient, using blood from 27 Rh negative blood donors. Although improvement followed each transfusion and the hemoglobin was raised from 29% to 70%, the patient's original illness became worse and she finally died. (See also page 346)

Science News Letter, June 2, 1945

PSYCHOLOGY

San Francisco Conference Neglects Important Step

► THE TRAINING of the coming generation to accept an international way of thinking is one essential step that is in danger of being overlooked at the San Francisco Conference, and no mention was made of it in the Dumbarton Oaks proposals, declared Dr. Gordon W. Allport, chairman of the Department of Psychology at Harvard University, and Dr. Gardner Murphy, chairman of the Department of Psychology at the College of the City of New York. They pointed out that to date nothing has been said of educational goals for all nations to adopt, nor are there any binding commitments to teach the children of the earth an international way of thinking.

Recommendations to the San Francisco Conference made by Dr. Murphy and Dr. Allport, while speaking as guests of Watson Davis, director of Science Service, on the CBS public service feature "Adventures in Science", included the creation of certain symbols of international unity, such as international scientific institutions, art museums, parks, and even international universities, so that the world over, young people will have something concrete to look to, to admire, to become loyal to.

"I'd like to see a binding covenant that would commit all the United Nations to teach scientific facts about racial



LEAF PATTERN—This photograph of a castor bean, by Jon D. Dodds of Benton, Ky. was selected as the best in the Plant Life Class in the Seventh International Salon of Nature Photography conducted by *Hobbies*, the magazine of the Buffalo Museum of Science.

and international differences. No race is entirely superior to any other. All are just about alike. The differences in language, color, and custom can be taught in a way to arouse the pupil's interest and respect, rather than in the old-fashioned way, to arouse contempt and hatred. Race prejudice is not instinctive. No child is born a bigot. Our national hatreds are learned, and education should be changed in every country to make sure that wholesome attitudes are learned," Dr. Murphy asserted.

Pointing out that if our peace plans are to work, all races will have to participate equally in the plan for collective security, Dr. Allport urged a world-wide public opinion poll.

"We have excellent means today of finding out what the man in the street wants, needs and thinks. Why shouldn't this method be used to keep statesmen informed of the condition of public opinion all over the world?" Dr. Allport asked.

The two speakers pointed out that for a successful peace we must replace age-old power politics with a policy that makes full use of the state of mind of the common people.

Science News Letter, June 2, 1945

MEDICINE

Virus May Cause Cancer

Also being studied are the possible relation of diet to cancer and the effect of spleen tissue on cancer. Successful control now held more likely.

➤ HOPE of success in controlling cancer "within a reasonable time" is held by scientists at the Clayton Biochemical Institute of the University of Texas.

Evidence from their studies tending to show cancer is caused by a virus or virus-like substance is the basis for this hope. At the same time, the Institute is not neglecting other avenues of approach to the problem, including the dietary one. A long-range research program is under way, Dr. Roger J. Williams, director, states in the second report of the Institute's cancer studies.

The virus theory is based on work by Dr. Alfred Taylor and associates. They have been able to produce breast cancers in mice with a virus-like material obtained from the yolk-sacs of chick embryos previously inoculated with extracts of mouse cancer tissue. After the cancer tissue had been growing on the yolk-sacs for a time, the yolk, cancer, blood and fluids of the egg were treated in various ways, including filtration through a fine filter, to remove all cancer and

other cells. Only a virus is small enough among living organisms to go through such a filter. Consequently when healthy mice developed cancers after injection of this material, the scientists felt certain it was a virus that caused the cancer.

Latest efforts have been to develop methods for obtaining this cancer-producing material such that the results can always be duplicated and then to develop methods for studying the virus. If this research shows that the cause of cancer is a virus, there is hope that methods of controlling it can be discovered.

Still in the early stages are the studies of the possible relation of diet to cancer and of the effect of spleen tissue on cancer. Spleen cells, Dr. R. E. Hungate and Miss Hester Snider find, always show a tendency to slow or check the growth of cancers in eggs. This finding which supports that of other scientists is considered important because it emphasizes a technique with which a killing of cancer cells by other cells can be studied.

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Munter, U. S. Public Health Service, points out in his report.

The disease was recognized within 26 hours after its start and treatment started at once. The patient had had a large amount of plague vaccine the year before. This, plus the modern treatment facilities and excellent nursing, probably played a part in his recovery. The disease did not spread to anyone else.

Penicillin, previously found effective in protecting laboratory mice against psittacosis, is credited with helping a human patient to recover in the case reported by Drs. Harrison F. Flippin, Michael J. Gaydosch and William V. Fitzipoldi, of Philadelphia.

Science News Letter, June 2, 1945

PUBLIC HEALTH

Cases of "Diaper Rash" Traced to New Antiseptic

➤ FIVE cases of "diaper rash" have been traced to a new antiseptic solution used by a diaper service, Dr. William L. Dobes, of Atlanta, Ga., has reported. (*Journal, American Medical Association, May 26*)

The solution, marketed under a trade-name, was used as the final rinse by the diaper service. The company making the rinse claims, Dr. Dobe states, "that its purpose is to make textiles actively antiseptic as a protection to persons and as a prevention of destruction of textiles by bacteria, germs, mold and mildew."

The chemical is "a primary skin irritant in strong concentration and a sensitizer in weak concentrations," a U. S. Public Health Service official informed Dr. Dobes.

A commercial testing company has reported testing samples of cotton fabric treated with the chemical. No irritated areas developed on any person on whose skin these samples were placed for 48 hours, removed for 24 hours and replaced for another 48 hours.

Dr. Dobes made the same kind of test on one of his patients with one of the diapers treated with a much weaker solution of the chemical. The test was positive after 24 hours.

When mothers of babies who had the diaper rash used their own diapers instead of those from the diaper service, the rash cleared up in three to seven days. It came back immediately when the babies started wearing diapers from the diaper service.

The diaper service was very coopera-

MEDICINE

Pneumonic Plague Remedy

Sulfadiazine treatment is credited in part for the recovery of one patient. Thiouracil helped seven out of 10 with angina pectoris.

➤ NEW SUCCESSES in treating pneumonic plague, heart disease and psittacosis are reported in the *Journal of the American Medical Association* (May 26), which also reports success with penicillin treatment of neurosyphilis.

Thiouracil, a chemical which suppresses the thyroid gland hormone, helped seven out of 10 patients with angina pectoris, Dr. Wilhelm Raab, of the University of Vermont College of Medicine, reports.

Symptoms were completely relieved in four of the patients during treatment. One was only slightly improved, while two were not helped and died. The treatment is effective in the same way that removal of the thyroid gland helps some patients with angina pectoris. It has the

advantage of not involving a major surgical operation. The thyroid hormone, Dr. Raab believes, sensitizes the heart muscle to the oxygen-depriving toxic action of epinephrine, one of the adrenal gland hormones. When the thyroid is removed by operation or suppressed by thiouracil, the heart is protected.

Sulfadiazine treatment is credited in part for the recovery of the pneumonic plague patient. He was a physician engaged in plague research with the U. S. Public Health Service, in the course of which he contracted the disease. No one knows how this accident occurred.

He suffered from the pneumonic form of the disease. Recovery from this is so rare "that for all practical purposes the disease is considered fatal," Dr. Edgar J.

tive and because of the potential dangers, omitted the rinse. The babies got over the rash and have not had any more although the same diaper service is being used. The fact that the anti-

septic solution is the only ingredient omitted by the laundry confirms the diagnosis that it was the cause of the trouble.

Science News Letter, June 2, 1945

OPTICS-PHOTOGRAPHY

Better Photos After Dark

New developments in optical science cut lens reflection. Will mean better photographs will be possible under poor light conditions.

► LENSES and glass produced by the American optical industry today by mass production methods are equal to or superior to the best hand-made items produced by German craftsmen, who were long considered leaders in the field. Many important developments that have made this record possible stem from research carried out by scientists at the Frankford Arsenal in Philadelphia, where high-school girls produce lenses and prisms for intricate gunsights, periscopes, and bombsights with speed and precision that is the envy of optical artisans.

From the cutting of the lens blank, through the rough grinding, fine grinding and polishing stages, all of the work is done by machines. With the active cooperation of industry, machines that were never meant to see the inside of an optical shop are speeding the production of lenses. Blanchard machines, used to cut, grind and polish metal, are employed to rough out lens blanks. A curve generator, with a mechanical arm that replaces the human arm, rough-grinds the lens blanks to tolerances of less than one millimeter. Over 60 different kinds of abrasives are used in the grinding of precision lenses. These range from coarse abrasives of synthetic aluminum oxide or silicon carbide in particles as large as 290 microns (one micron equals one-thousandth of a millimeter) down to fine abrasives only five microns in size. One of the fine abrasives used is made from domestic garnets. Enough rouge is used yearly on just one of several dozen lens-polishing machines to supply about 11,000 women with their cosmetic requirements for a year.

As a standard procedure, all lenses manufactured at Frankford Arsenal must be coated with a thin film of magnesium fluoride before being installed in instruments. This coating increases the transmission of light through the lens by 25%, through reducing reflection. This means

increased visibility at all times, and particularly at dusk. It extends the good hunting time for our armed forces at least one-half hour at dusk. Since the magnesium fluoride coating permits more light to reach the eye, it will have many postwar uses in spectacles, microscopes and camera lenses. Glass coated with the metal is easier to keep clean, and fingerprints do not show up on it.

Lenses to be coated are mounted in a hemisphere-shaped rack which is suspended inside a large glass cylinder above a crucible cup containing finely powdered magnesium fluoride. The air is exhausted from the cylinder, leaving a nearly complete vacuum. Then a tungsten filament above the crucible cup is turned on and heated to a high temperature. The heat causes the magnesium fluoride to evaporate and condense on the lens surface, leaving a thin, almost invisible, film less than a millionth of a millimeter thick. The process takes about one hour to complete.

By depositing several magnesium fluoride films, one on top of the other, it is possible to increase reflection instead of cutting it down. This discovery may lead to new types of mirrors with the reflecting surface facing out, instead of into the glass.

For years, balsam, an oily, fragrant resin, has been used to seal parts of lenses together. However, since lenses sealed with it would not stand up in the extremely low temperatures encountered in high-altitude flying, or in the heat of a Pacific atoll, a new substitute had to be found. Men from the optical laboratory here went in search of a substitute and came up with new thermal setting cements. The one in use at Frankford Arsenal today is known as CR-39, which looks like kerosene when cool, but becomes a jelly when heated. The formula for this synthetic resin cannot be revealed at present. The other usable ce-

ment is a resin containing butyl methacrylate.

In using these cements, the lenses are pre-heated, the cement applied, and then the lenses are baked in an electric oven at about 200 degrees Fahrenheit for as long as 2½ hours. Although balsam is easier to use and dries in 15 minutes, the properties of the new thermal-setting cements make them more desirable for general use.

Science News Letter, June 2, 1945

A good queen bee lays from 2000 to 3000 eggs a day.

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RADIO

Radio Space Allocated

Final decision reached by the FCC on places for standard broadcasting, television, airplane radio, and police. FM is still unsettled.

➤ AFTER SEVERAL months of deliberation the Federal Communications Commission has finally made up its mind how it will allocate space in the radio spectrum to standard broadcasting, television, airplane radio, police and other services. The stumbling-block in making final the FCC proposals published last January were the long-drawn-out objections registered by owners and operators of Frequency Modulation (FM) radio stations. FM radio is staticless broadcasting.

No final decision has yet been reached by the FCC regarding the place in the radio spectrum that will finally be set aside for FM or for the space below 25 megacycles. Three possible sections of the waveband are under consideration, and during the coming summer months, scientists of the FCC will experiment with FM broadcasting in these three parts of the spectrum to determine which of the three is best for FM radio. These experiments will be conducted at the field offices of the FCC, from which FM broadcasts will originate. Cellulose tape recording equipment that can record sound for several hours without stopping will be placed at various spots in the area around each FM station. Continuous recordings will be made day and night. From these recordings, engineers will be able to find out just which section of the spectrum permits FM broadcasting with the least interference.

The spectrum is still congested, although every service that asked for space in the airplanes got at least a part of what it asked for. In making the decisions, the commissioners engaged in a give-and-take study, giving more space to services which proved by their testimony that they needed more frequencies in order to carry out their operations in the public interest, and to new services that promise to extend the use of radio to the benefit of more people.

Probably the most important new radio service is the Citizens Radiocommunication Service, which will make it possible for every U. S. citizen to have his own broadcasting station in the form of walkie-talkie or handie-talkie equip-

ment. Regulations covering licensing and operation of the equipment will be simple and easy to comply with. The only stipulation made by the FCC is that no charge may be made for messages carried over the air in this portion of the spectrum.

Other new services that have heretofore never been licensed are radio for railroads; rural radio communication for farmers that will permit them to reach telephone communication lines and make use of telephone service even though they have no telephones; and mobile radio for buses and cross-country trucks.

The allocations extend to 30,000,000 kilocycles in the spectrum, farther than the FCC has ever before licensed. This is by no means the upper limit of the radio spectrum, and in the future the

FCC may allocate channels to services beyond that super high frequency range.

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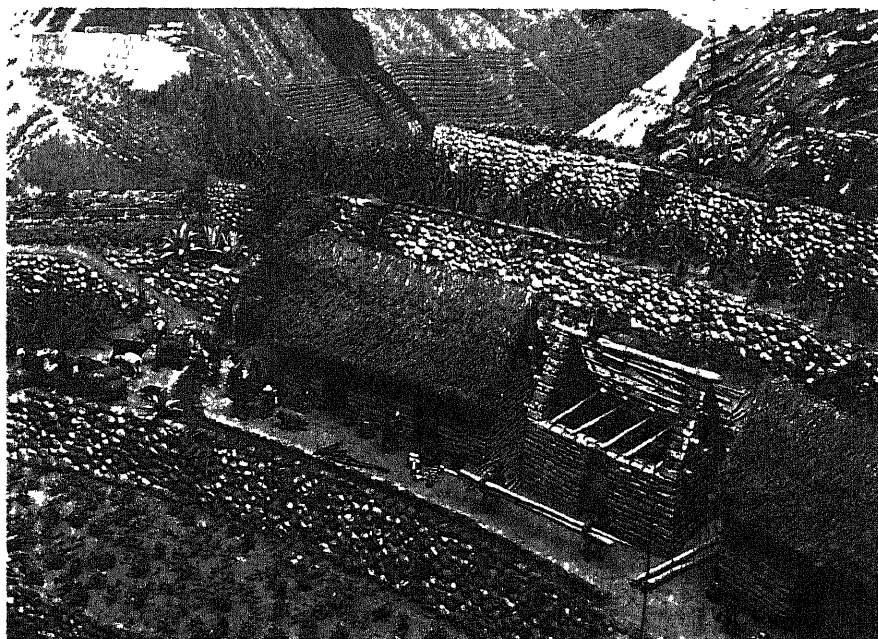
CHEMISTRY

Training of Chemists at Standstill Due to War

➤ WAR HAS all but stopped basic, academic research in chemistry and has stopped the training of new research chemists and chemical engineers, Dr. Roger Adams, leading organic chemist, head of the University of Illinois chemistry department and head of chemical work of the U. S. Office of Scientific Research and Development, charged in a radio talk.

"Basic scientific research finds new truths, and supplies new material upon which much of the industrial progress of the future depends," Dr. Adams said. "Years will be required before basic research activity again reaches its prewar level."

"The war also has stopped the training of new research chemists, and chemical engineers. Thousands of academic and industrial chemists have been drafted



INCA VILLAGE—A miniature model of an Inca village, as it appeared about A.D. 1450 in the Urubamba Valley in southern Peru, has been completed at the Chicago Natural History Museum, and added to the exhibits. The model is based upon observations of ruins made by Donald Collier, curator of South American ethnology and archaeology, during expeditions to South America. The scene represented is in a mountain valley at an elevation of 9,000 feet, near Cuzco, which was the capital of the Inca empire. The village represented is still inhabited by modern descendants of the ancient Incas.

into the armed services with only a few of them in a position where they can use their technical knowledge.

"The research organizations associated with industry, which find new products and upon which industry relies for expansion and for creation of new jobs, are at a low ebb. There is no possibility that they can recover quickly in the near future. This is a matter of great concern to the scientists and should be to the

public, for only by years of patient research by trained and competent investigators can we maintain the high level of achievement in the field of science, on which is based position of eminence among nations."

Dr. Adams talked during the intermission of the New York Philharmonic Symphony broadcast sponsored by the United States Rubber Co.

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METEOROLOGY

Pacific Area Typhoons

Due during the summer and fall months, they are similar in violence, velocity and rainfall to the Atlantic and Gulf Coast hurricanes.

➤ TYPHOONS in the Pacific war area, due during the summer and fall months, will be something new to many American soldiers and sailors, but not to those who know the hurricanes of the Atlantic and Gulf coasts. They are similar in origin, nature, violence, velocity and the amount of rainfall accompanying them. They constitute real hazards for both sea and aircraft. Some 20 severe typhoons occur each year in the Philippine-Okinawa-Japan region.

The usual path of the Pacific typhoon is northerly, along the 1,000-mile eastern coast of the Philippine Islands, sweeping Formosa, and Okinawa and the other Ryukyu islands, and passing northeastward along the coasts of the Japanese mainland. Some pass through the Philippines into the South China sea and the coasts of Indo-China and southern China. Others pass through the Ryukyu islands into the East China sea.

The season for these typhoons extends from early August until late October but many of the most severe of them have occurred in July and in November. They occur in the season when the belt of equatorial calms in the Pacific reaches its most northerly extension. They are usually from 50 to 100 miles in diameter, and move forward rather slowly, but the circular whirl of air in them often reaches a velocity of 100 miles an hour or more.

They are usually accompanied by heavy rains which extend inland, covering western ports on the Philippines and other islands, making land movements as well as ship movements difficult. In one typhoon, Baguio, the summer capital of the Philippines, experienced the heaviest 24-hour rainfall ever

recorded, 46 inches, approximately the annual rainfall in eastern United States. This storm was on July 14-15, 1911.

Tropical typhoons and hurricanes originate over oceans, where there is plenty of moisture and little resistance to winds, in the regions where the trade winds are dying out and merging with the doldrums or calms. The heat and the moisture of the doldrums are probably responsible. Typhoons and hurricanes form when the doldrums have moved away from the equator, where the deflective force of the rotation of the earth is sufficient to set up the whirl. In most cases the storms move westward as carried by the trade winds, then curve toward the poles of the earth. When they reach the middle latitudes, or over land, they lose some of their intensity and spread out, becoming less destructive.

Science News Letter, June 2, 1945

HOME ECONOMICS

Vitamin C to Keep Canned Fruits Bright

➤ A WAY has been found for home canners to keep their fruits from turning dark in the jars and developing an off flavor. It consists in adding vitamin C to the fruit during canning. Research showing that this will work and how the housewife can apply the findings is reported by J. J. Powers and Dr. G. R. Fellers, of Massachusetts State College, in the *Journal of Home Economics*.

The home canner gets her vitamin C in tablets at the drug store. Another related chemical will do the job, too, and is cheaper but because of the war it is not now available commercially. Each vitamin C tablet sold in drug stores is made

to contain either 25 milligrams (abbreviated mg), 50 mg or 100 mg of the vitamin. The label tells which.

For each pint jar the home canner should use one and one-fourth tablets of the 100 mg strength, or two and one-half tablets of 50 mg strength, or five tablets of 25 mg strength. If the label gives the strength in International Units, abbreviated IU, instead of milligrams, divide by 20 to convert into milligrams. If the potency of strength is 2000 IU, this is equivalent to 100 mg and you use one and one-fourth tablets for each pint jar. The 25 mg (500 IU) strength tablets would be easier to use, since they do not have to be divided.

This method of keeping home canned fruit from darkening is not expensive, however. Mr. Powers and Dr. Fellers estimate it, on the basis of prices in drug stores in their town, at between one and two cents per pint jar when the 100 mg tablets are used.

The vitamin tablets are put into the jars before they are filled with the fruit. All the other details of the home canning procedure are followed as usual. If quart jars are used, of course twice the amount of vitamin should be put in each of these larger jars. The method is good for pears, peaches and plums. It does not keep home canned applesauce from darkening though it improves its appearance. Darkening of the applesauce depends more on the variety of apple.

Vitamin C prevents surface darkening and development of off flavor by preventing oxidation, the cause of the condition. Even commercial canners must face this problem. They can overcome it more easily than the housewife, however. For one thing, there is less headspace in the usual commercial jar, so there will be less oxygen to cause deterioration. The commercial canner, moreover, vacuum seals his jars, which means less air is entrapped, and he can, if necessary, deaerate the food.

Science News Letter, June 2, 1945

ENGINEERING

Liquid-Cooled Dynamos For Electric Generators

➤ THE LIQUID-cooling principle, long standard with internal combustion engines, is applied to electric generators, in patent 2,376,441, granted to Harold M. Martin of Schenectady, N. Y., assignor to the General Electric Company. Tooth-like recesses are cut into the rotor, and in these the coolant is carried around, held against escaping by the opposed smooth surface of the stator and by confining baffles at the sides.

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ELECTRONICS-PHOTOGRAPHY

New Flash-Bulb Timer

Permits photographs to be taken in three ten-thousandths of a second. The unit depends upon a constant rate of electrical voltage increase.

➤ SIX PICTURES in three ten-thousandths of a second is the top speed with which photographs can be taken with a new flash bulb timer. This means that you could take six pictures of a 50-caliber bullet while it moves half its own length, after being fired from a gun.

The timer, developed by the photographic engineers of the Air Technical Service Command at Wright Field, uses microflash bulbs supplied by Dr. Harold E. Edgerton, professor of electrical engineering at Massachusetts Institute of Technology. Each lamp flashes in two millionths of a second. Six microflash lamps may be set off, either in a series or simultaneously.

The unit depends upon a constant rate of electrical voltage increase for the rapid firing of the lamps. Six lamps are connected to voltage amplifiers, so set that each one is a little less sensitive to voltage increases than the one next to it. As current is passed through the amplifiers, and the voltage rises, the lamps are fired.

Technically, the timer uses linear

charging of a condenser through a pentode tube, adapted from television. Linear charging makes it possible to time the pictures exactly by turning simple dials on the controls. The slowest speed at which the lamps can take a picture is six-tenths of a second.

The outfit is now used to study rupturing propeller blades, although it was originally conceived as a means of studying the effects of gunfire on armor plate. The first timer built could only take pictures within a range of six to eight feet. This distance has now been increased, and pictures can be made as far as 50 feet from the subject.

X-ray film and an f/2.5 night aerial camera lens are used to make the pictures. Microflash pictures are taken by opening the camera shutter in total darkness, flashing the lamps, then closing the shutter.

If necessary, the lamps may be set off by sounds which are picked up by microphones transmitting electrical impulses to the circuit. This is used in propeller-

rupture studies where the exact instant of rupture cannot be predetermined.

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PHYSICS

Physics Laboratory of Nobelists Found Intact

➤ DEPARTING Nazis have left undamaged the physical laboratory and equipment of Prof. Niels Bohr, world-famous scientist who in 1922 received the Nobel Prize for his researches on the structure of the atom. To the credit of leading German physicists, it is now made known that they refused to take possession of the Institute for Theoretical Physics when their political masters seized it on Dec. 6, 1943.

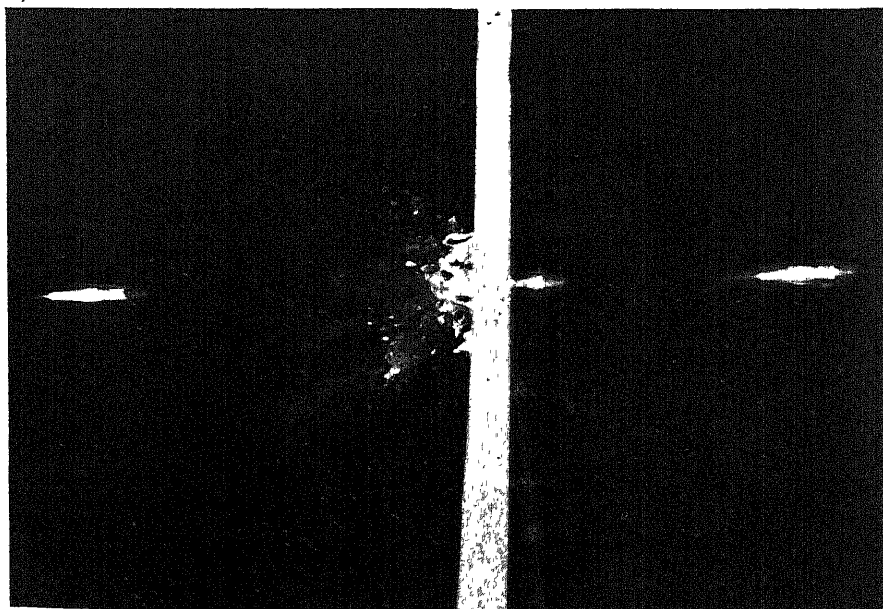
Because Prof. Bohr has Jewish blood in his veins, he expected persecution by the Nazis, and escaped to Sweden in October, 1943. With him went another eminent scientist who also had Jewish ancestors, Hungarian Prof. Georg Hevesey, who in 1943 was awarded the Nobel Prize in chemistry for his pioneer investigations on "heavy water."

Subsequently Prof. Bohr made his way to England, and on the pretext (subsequently proved groundless) that he was there engaging in war work for the Allies, the Nazis took possession of the Institute at Copenhagen, of which he is director. To insure against Danish sabotage of the equipment, Prof. Bohr's first assistant, Dr. Boegglid, was imprisoned for seven weeks; and even the laboratory foreman was locked up for ten days. When the Nazis were unable to find any competent physicist in Germany willing to act as receiver of this stolen property they finally reluctantly returned the Institute to the University of Copenhagen.

During Prof. Bohr's exile he was able to keep in contact with his fellow-workers in the laboratory by correspondence. He is known to be in the United States at present, though his exact whereabouts remains undisclosed. It is expected that he and Prof. Hevesey will return to Copenhagen before very long.

Another leading Danish scientist still in Sweden is Prof. August Krogh, noted for his researches on vitamins, who is reported to be under threat of assassination by Nazi gangsters. Prof. Krogh was awarded the Nobel Prize in medicine and physiology in 1920, and in 1937 he was made Foreign Associate of the National Academy of Sciences, the highest honor to a foreigner within the gift of that leading American organization.

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STANDS STILL!—Frozen by high speed photography at three points on its journey through an obstruction, this bullet apparently standing still, actually was speeding along its course when overtaken by microflashes at Air Technical Service Command headquarters at Wright Field.

ENGINEERING

Movies While You Ride On Tomorrow's Trains

► MOVIES while you travel will be commonplace on tomorrow's railroads, reported Charles W. Wright, vice-president and engineer of the Pullman Standard Car Manufacturing Company. Engineers and designers are giving more thought to passenger comfort during the waking hours on long trips, he stated.

"We have a new recreation car that is a conventional observation-lounge car by day, but at night it can be converted into a miniature theater and club, so that you can see movies or dance while you travel. It includes a refreshment bar, as well as tables and seats that fold back to provide dancing space. Observation chairs can be shifted to face the movie screen. In the dining cars, traditional rectangular tables have given way to diagonally placed tables with deep cushioned chairs and alcove divans," Mr. Wright stated, speaking as the guest on the CBS program "Adventures in Science" directed by Watson Davis.

The diagonally-placed tables in the diner will reduce aisle congestion and permit more efficient service, he pointed out.

For safety and comfort, Mr. Wright declared that tomorrow's trains will have intra-train telephone systems that will permit train crews to keep in constant touch with each other. Insulation, cushioning, and sound deadening will permit the control of temperatures within the cars, and eliminate noise and vibration. New electrically-controlled brakes will make smoother stopping possible in shorter distances. Soft springs and shock absorbers on the trucks of cars will give floating comfort ride.

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MEDICINE

Syphilis of Brain Helped By Penicillin Treatment

► DEMENTED patients and those suffering bouts of excruciating pain or unable to walk because of syphilis of the brain and nervous system may be helped by penicillin, it appears from a report by Dr. Douglas Goldman, of Cincinnati. (*Journal, American Medical Association*, May 26).

Penicillin alone and combined with fever treatment has been given to 22 such patients at Longwood State Hospital. In the group 18 had the mental disease,

dementia paralytica, two had locomotor ataxia and two suffered the excruciating pain of tabes.

All but two of the 18 with mental symptoms have improved. Some are "apparently recovering rapidly from their disease," Dr. Goldman reports.

Of this group, two patients died. They were practically dying, in a "state of pronounced mental and physical deterioration" before the treatment was started. Penicillin was given them not with any hope of saving them but as a test of the safety of the drug for patients suffering from syphilis of the brain.

Of the patients with tabes, one was a woman who suffered every 30 days with five- to 12-day bouts of pain so severe she wanted to kill herself. She has been free from pain for about three months and has changed from a distracted, depressed state to one of normal warmth and brightness. The other patient in this class has also "enjoyed remarkable relief from pain."

It is too soon to be sure how the patients with locomotor ataxia will get along but one has shown some definite improvement.

The results are good enough, Dr. Goldman says, to justify further study of this method of treating neurosyphilis.

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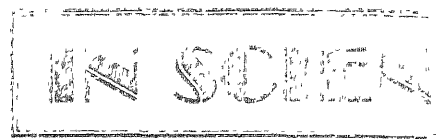
HORTICULTURE

Fluorescent Lamps Take Place of Greenhouse

► CUTTINGS of woody plants have been successfully rooted in basement rooms, with fluorescent lamps substituted for the daylight of conventional greenhouse practice, in experiments reported by three U. S. Department of Agriculture workers, Dr. V. T. Stoutemyer, Albert W. Close and F. L. O'Rourke. These experiments, they suggest in *Science* (May 25), point the way to considerable possible savings in commercial nursery practice, since both temperature and humidity are more easily and cheaply controlled in rooms with ordinary walls than in glass houses.

The three men worked with a wide variety of plants, including citrus, cinchona, hibiscus, bougainvillea, weigela and privet. Soil temperature was maintained at the desired level by means of lead-coated heating cables. Some of the plants responded best to continuous illumination; others gave better results when they had light for only 16 hours out of the 24. The needs of each species must be worked out individually.

Science News Letter, June 2, 1945



AERONAUTICS

Four-Engine Flying Boat Is Largest British Plane

► THE LARGEST British airplane yet to take to the air is the 58-ton four-engined Shetland Flying Boat that could fly from London to Bombay, about 4,650 miles, non-stop at 184 miles an hour. It is larger and has a longer range than the American-built Martin "Mars," largest U. S. flying boat. The airplane is a double-deck ship with accommodations for 70 passengers and a crew of 11, and is fully air-conditioned. There are three main compartments as well as a promenade on the after upper deck, a fully equipped kitchen, and rest rooms.

The new giant of the sky, built by Short Brothers, is powered by four 2,500 horsepower Bristol Centaurus air-cooled, 18-cylinder engines. These powerful engines turn four-bladed propellers which have blades measuring 15 feet, 9 inches in length.

The wingspan of the Shetland is 150 feet, greater than that of a B-29 Superfortress, and it has an overall length of 110 feet. Fuel tanks carry more than 6,000 gallons of gasoline and 320 gallons of oil.

Science News Letter, June 2, 1945

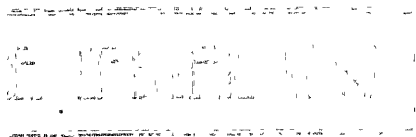
CHEMISTRY

Anti-Knock Motor Fuel Uses Lead Substitutes

► ANTI-KNOCK motor fuels of high octane value can now be produced through the addition of compounds of heavy metals other than lead. U. S. patent 2,375,236 has been issued to Dr. Pharis Miller of Elizabeth, N. J., on a basal formula for the anti-knock compounds; he has assigned rights to the Standard Oil Development Company, by which he is employed.

One compound which Dr. Miller regards as especially successful is built around the relatively little known element rhodium; the molecule also contains the carbon monoxide and ammonium groups and either iodine or chlorine. For the rhodium, any of the following elements may be substituted: copper, thorium, lead, chromium, manganese, iron, nickel or cobalt.

Science News Letter, June 2, 1945



BOTANY-CHEMISTRY

Pine Tree Produces Useful New Chemical

► THE PINE tree produces a chemical to keep its heart sound. This chemical, which has the somewhat poetic name of pinosylvine, may also prove useful to humans in their struggle against disease germs, it appears from studies reported by Dr. K. O. Frykholm, of the Institute of Public Health, Stockholm, in *Nature*, British scientific journal.

Pinosylvine was discovered in 1939 by another scientist. It protects the tree's dead heart-wood against wood-decaying fungus and insects. The dead heart-wood is both the principal mechanical support of the tree and makes the best lumber. Chemically, pinosylvine is a derivative of stilbene and closely related to resorcinol and its derivative, hexyl-resorcinol.

This led Dr. Frykholm to explore further its anti-germ properties. He found that its power to stop the growth and kill one of the germs that cause food poisoning is from seven to 30 times as strong as that of phenol, or carbolic acid.

Pinosylvine and its monomethyl ether, Dr. Frykholm concludes from this and other tests, seem to have the strongest germ-killing power of any phenol substance found in nature and isolated. This suggests possible use as an antiseptic.

Its poisonous action, however, is greater than that of phenol. The poisoning symptoms are different, there being no convulsions.

Science News Letter, June 2, 1945

MILITARY SCIENCE

Ship-Based Mortars Blast Jap Troops in Pacific

► TOUGH, maneuverable, and a small target; mortars mounted on infantry landing craft range up and down enemy-held coastlines in the Pacific theater lobbing shells into areas which cannot be reached by ordinary artillery. The path of the mortar shell is a sharp arc, like the trail of a robot bomb. As one infantryman remarked, "You can shoot over a wall and hit the vines creeping up the other side."

The new mortar-carrying ships, after dropping their cargoes of infantrymen

on the beaches, throw up intense fire to fill the interval between the cessation of naval gunfire and the opening bursts of our land-based artillery. Observers on Iwo Jima reported that Yanks on the beachhead were supported in part by the hard-hitting mortar boats which rampaged along the coastlines blasting Japanese supply areas and troop concentrations and knocking out enemy artillery emplacements.

The idea for using ship-based mortars was developed by the Pacific Ocean Areas Chemical Warfare Service. A successful weapon in the European theater, the 4.2-inch chemical mortar is proving its worth again in these Pacific operations. It is actually a light, mobile cannon, designed for rapid high-angle fire of large capacity shells, its maximum range is generally less than 3,000 yards or about one and one-half miles.

Science News Letter, June 2, 1945

CHEMISTRY

Four Ways to Make Styrene From Petroleum Fractions

► STYRENE, which is combined with butadiene to make GR-S, most commonly used of synthetic rubbers, can be produced from petroleum fractions by a number of methods. Patents on four such methods have been issued to three chemists on the staff of Universal Oil Products Company, of Chicago, to which firm all rights have been assigned.

Dr. Gustav Egloff, well-known chemist who is director of research for Universal, received patent 2,376,532 and 2,376,533. His process starts with a mixture of benzene and ethylene, which combine in the presence of a catalyst to form ethyl benzene. The latter compound is put through a second catalyzing process with ethane, in which a dehydrogenation reaction completes the conversion into styrene.

Somewhat similar is the process on which patent 2,376,709 was issued to Dr. William J. Mattox, except that a mixture of xylene and ethyl benzene is used instead of the ethane-ethyl benzene mixture. A high-octane motor fuel is one by-product of this process.

In the method on which patent 2,376,549 was issued to Dr. Julian M. Mavity, both butadiene and styrene, the two ingredients of GR-S, are turned out simultaneously. In this process the essential materials are ethyl benzene and a petroleum fraction described only as "a normal C₄ hydrocarbon containing at least eight hydrogen atoms."

Science News Letter, June 2, 1945

PHYSIOLOGY

Movies Put Temperature Up, Do Not Relax Body

► HOLLYWOOD may be able to use a new scientific finding to predict the box-office success of various pictures. All that would be necessary would be to take the temperatures of members of preview audiences before and after seeing the film, Dr. N. Kleitman, of the University of Chicago, suggests. (*Science*, May 18)

Body temperature goes up from one-half to one degree Fahrenheit while attending motion pictures, Dr. Kleitman has found. The rise is enough to be called "highly significant."

Going to the movies is far from being relaxing in the physiological sense, this finding shows. The picture may give "escape from the humdrum reality of existence." However, even though the spectator is sitting, presumably relaxed in a comfortable seat, for two or more hours, the subject matter of the film makes his muscles tense to such an extent that his temperature goes up.

Dr. Kleitman became interested in the effect of motion pictures in the course of a long study of the daily body temperature cycle. He found that after attending a two- or three-hour motion picture show, the subject's temperature was higher than usual for that particular time of day.

A teen-aged girl who went to the movies every two or three weeks over a period of two years and a young lady in her early twenties who was a "movie addict" and went to 29 shows in two months were subjects of special study.

The teen-ager's "movie" temperature ranged between 99 and 100.15 degrees Fahrenheit. At the same time, about 4 p.m., on non-movie days, it ranged from 97.95 F. to 99.70 F. The young lady "movie addict" went to shows mostly in the evening. Her temperature rose about half a degree on movie nights, though when she saw a double feature, her temperature was lower after the second feature than after the first. Either the second feature was less effective than the first in raising the temperature or the normal fall in temperature late in the evening was too strong to be reversed.

"It remains to be seen," says Dr. Kleitman, "whether the collective change in the body temperature of a preview audience can be used to predict the box-office success of a film."

Science News Letter, June 2, 1945

PHYSIOLOGY—GENETICS

Blood That Kills

Rh anti-bodies rob some babies of life and make transfusions dangerous for some people. Science has taken steps to overcome these handicaps.

By MARJORIE VAN DE WATER

See Front Cover

➤ BLOOD that kills . . . Babies robbed of the blood of life before they ever taste their first breath. . . Mothers weakened and sometimes killed by the blood of their loved ones. . . Children who must go through life with minds dulled or damaged. . . Wounded soldiers that may be killed by transfusions intended to restore them to health.

This is the tragic story of Rh—blood group only recently known to science.

There is nothing poisonous about Rh blood. It is normal, healthy blood. Probably you, yourself, have Rh blood. Between eight and nine persons out of every 10 do have it. But a few persons—15 out of each hundred in the United States—do not have Rh blood.

And that is where the trouble comes, because Rh blood and blood which does not have this Rh factor do not mix well. It won't hurt you, if you have Rh blood, to have a transfusion of blood that does not have the Rh factor—Rh negative blood, it is called. A single transfusion of Rh blood won't hurt the person with Rh negative.

But after one transfusion, the Rh blood in an Rh negative person acts in somewhat the way a disease germ does to set up automatic defenses in the blood stream. So the Rh negative person starts to create a substance in the blood to kill and drive out the Rh blood.

Very Powerful

This killing substance is very powerful. If repeated transfusions of Rh blood should be given this person who has built up the anti-Rh substance, the Rh blood would literally be consumed, destroyed, the blood cells killed—completely. The dead cells then act as a poison in the kidneys of the patient. (See story on page 338)

It was not easy to see the link between this killer in the blood and the deaths of infants at birth or before birth or a few days after birth. Even after the Rh blood factor had been identified, phy-

sicians did not understand at first how it could kill infants.

It was first found in Rhesus monkeys and that is how it got its name, the Rhesus factor or Rh, for short.

For many years, a real-life medical mystery drama has been acted and reenacted. For years, medical scientists have been searching for the solution—trying to track down and identify the killer.

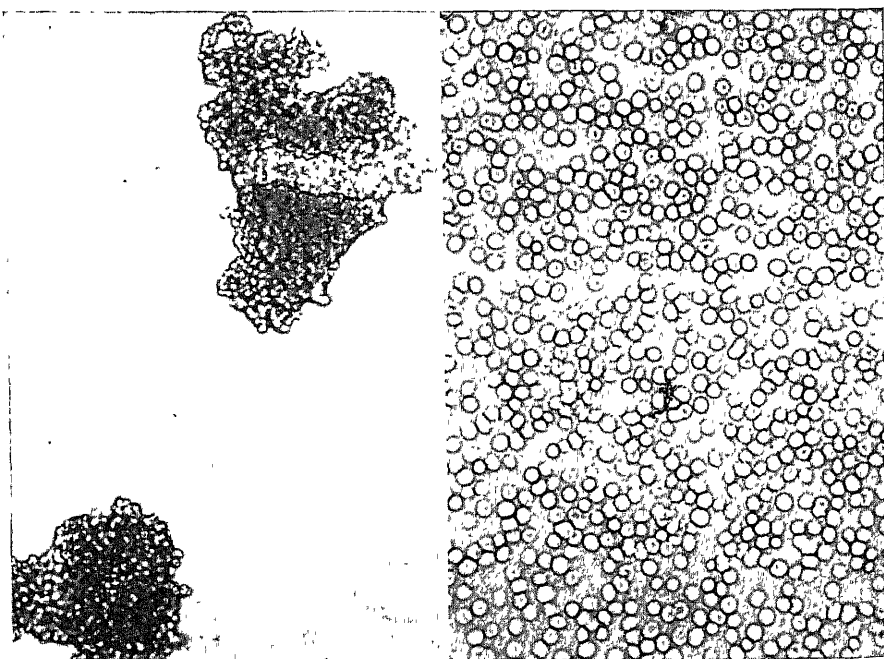
This was the plot: A father and mother have one child. Thus far, it looks as though the story might have a happy ending. But now tragedy enters; the second child dies at or before birth, or perhaps lives a matter of hours or days. There is nothing to account for the death, so the parents are still hopeful of adding to their little family. And then may follow a long series of domestic tragedies; child after child may die in the same way. Why?

Well, this was at last found to be the solution: The father, like 84 other men out of each hundred, has Rh blood. The mother has Rh negative blood. Because the Rh factor is what students of heredity know as a dominant trait, the child with one Rh positive parent and one Rh negative parent will always be Rh positive.

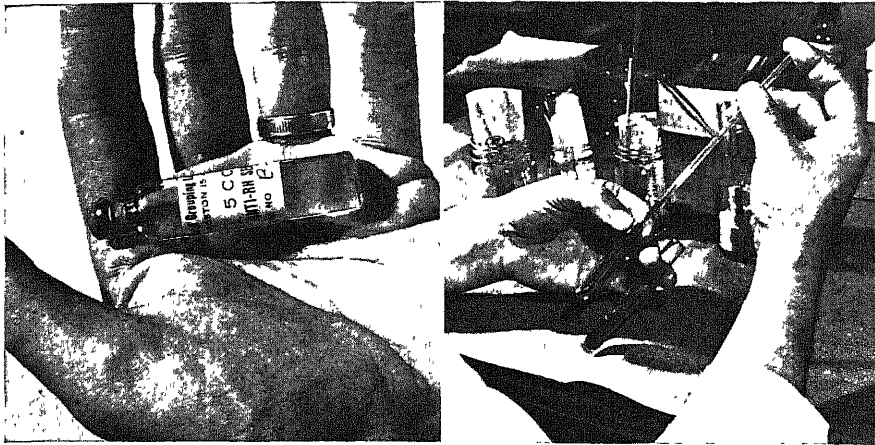
So it happens that the mother with Rh negative blood is carrying a child who inherits in its own blood the Rh positive factor. And there is a little, not much, but a little mingling of the blood of mother and unborn child.

This does not hurt the baby at first, because the Rh negative blood has nothing in it that can harm the blood of an Rh positive person. But when the Rh factor from the baby's blood enters the bloodstream of the mother, then harmful things do happen. The potent anti-bodies—the Rh killers—are built up in the mother's blood. And, gradually, these anti-bodies are transferred to the bloodstream of the infant.

The process goes on quite slowly. So that the first child may be safely born



FINAL EXAMINATION—After incubation and centrifuging, the blood is examined under a microscope. If the cells have clumped together (left), then the blood is positive Rh blood. If the cells show the normal distribution after the serum, then the blood is Rh negative. (right). Photographs by the Army Institute of Pathology for Science Service.



TESTING FOR RH—The small vial (left) contains enough serum to make hundreds of tests to find out whether blood is Rh positive. After the blood to be tested has been diluted with salt solution, it is put in the tube with the anti-Rh serum (right). Photographs by Fremont Davis, Science Service Staff photographer.

before too much harm is done. Usually, the mother has great difficulty during the birth and may be so ill that she needs a blood transfusion. If, then, the husband comes forward as is natural and offers his blood for the transfusion, the result may be very bad for the mother. But, in general, both mother and the first child may survive.

But the anti-bodies do not disappear from the blood of the mother after this birth. They are there for three or four years or possibly even for the entire lifetime of the mother; the exact length of time they survive is not yet known. But during all the time that the anti-bodies are there in abundance in the mother's bloodstream she can never give birth to another Rh positive child. Not, that is, without the intervention of modern medical skill.

Now that the killer in this particular medical mystery is known, it is possible, in some cases, to save the baby before

the Rh anti-bodies have done their deadly work.

The baby shown on the cover of this SCIENCE NEWS LETTER in a photograph by Fremont Davis, staff photographer, lives today because of recent knowledge about Rh.

When the baby is born with blood partly or almost entirely destroyed in the condition called erythroblastosis and the normal red blood replaced by a greenish-yellow substance that makes the infant take on a jaundiced look, they give it immediate transfusions. The transfusions must be with Rh negative blood, because Rh positive would immediately be destroyed by the anti-bodies that permeate the baby's blood.

Not one, but many transfusions are given, so that the baby's blood is entirely replaced by the fresh, donated blood. So much new blood is given that the baby's blood-group is completely changed.

In modern hospitals, the physicians are prepared for the arrival of an Rh baby to an Rh negative mother, because the mother's blood is typed, not only for the better known groups such as A, B, AB, or O, but also for Rh. Professional blood donors are typed for Rh and all those who have Rh negative blood kept ready for instantaneous call in case of need.

In New Jersey, the Paterson Board of Health and the Passaic County Medical Society have founded an Rh negative blood donors club from among Rh negative mothers. In that county, it is routine for the blood of many expectant mothers to be sent to the Board of Health for Wassermann tests. At the request of



Dagobert D. Runes, Editor

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Do You Know?

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A *half-inch rope* made of nylon can support a load of three tons.

Old *apple trees* in poor soil are invigorated by pruning, and by cutting out weak wood and slender outside shoots.

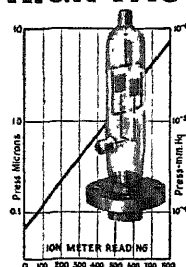
Oleomargarine, when properly fortified with vitamin A, is equal in nutritive value to butter.

America has shipped Russia 20,000 tons of *seeds* for 1945 spring planting, largely for garden and field crops.

Rats introduced on the Polynesian islands do much damage to growing coconuts.

A common *toad*, according to one estimate, is worth \$25 a year to a farmer because of the large number of injurious insects it eats.

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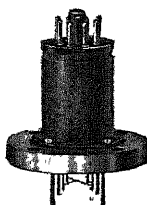
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the Medical Society, the Board has also used part of the blood sample to type it for Rh. Naturally, these expectant mothers could not be expected to give their blood right away, but their names and addresses are kept so that in the future they may be called upon for the precious and at times badly needed donations.

Typing for Rh blood factor is done in much the same way as other blood group typing except that it must be done much more carefully. It is necessary to keep the blood sample at a certain temperature for quite a long time before the clumping of the blood cells shows up the fact that the sample is not of the same type as the test material.

Although it is always a hazard for a woman with Rh negative blood to have a child if her husband is Rh positive, it sometimes happens even without any special transfusions or other emergency care that the child in such a family may live and be healthy. That is because it is possible for the child to be itself Rh negative and so its blood would not be antagonistic to the blood of the mother.

50-50 Chance

Although, by the laws of genetics, an Rh positive father would always have an Rh positive child if he inherits Rh positive genes from both his parents, about half the Rh positive fathers do carry Rh negative inheritance. Then, in spite of having Rh positive blood himself, the father has a 50-50 chance that any of his children would receive the Rh negative part of his own inheritance. This may happen, even in families that have had previous tragic loss of their babies.

The Rh negative killer does not do all its damage in killing infants, however. Those who survive may still face the danger of lowered intelligence due, perhaps, to the destruction of blood cells at the critical time before birth. Evidence pointing to this further crime is found in tests of the blood of the mothers of feeble-minded children, the implications of which are discussed in a recent issue of the *Journal of Heredity*. A much higher proportion of Rh negative mothers was found than the 15% that might be expected from the proportion in the general population.

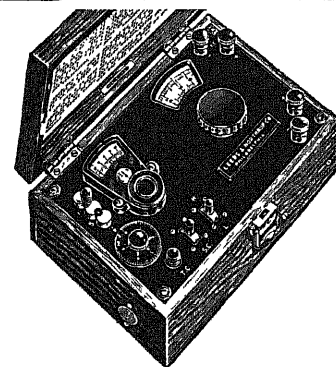
It has been suggested that all men in armed services should be typed for Rh in order to prevent danger to them through emergency transfusions. There are two good reasons why this was never done, however. In the first place, in most of the transfusions in our Army plasma

and not whole blood is used, and in plasma the blood group of the donor does not matter. In the second place, there just is not enough of the rare Rh negative blood available to make the tremendously large quantity of serum that would be required to type the blood of eleven million men.

Both the Army and Navy are alert, however, to take advantage of all the recent discoveries in this field, and many lives have been saved in this way.

It is possible, whenever a man has had a bad reaction to a blood transfusion, to type that man's blood for Rh. If he is Rh negative, then any further transfusions given him must be Rh negative blood.

Much research is still ahead for medical scientists in this field before the crimes of Rh blood can finally be prevented. Since 1941, when this blood factor was originally discovered by the scientists Landsteiner and Wiener, much ground has already been explored, but unfortunately many of the attempts to solve the problem have failed to meet success. The idea was developed that the mother's blood might be tested frequently as the anti- (Turn to page 350)



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Sneeze-Stimulators

➤ HAYFEVER victims begin sneezing and sniffing early in spring, and keep it up until a plant-killing frost cuts off the supply of misery-bringing pollen. There are, however, two crescendos in the annual chorus of involuntary explosions. The first (and lesser) coincides with the blossoming of grasses and the narrow-leaved plantain; the second (and worst) comes with the mass shedding of pollen by the ragweeds. Many innocent flowers are falsely accused, and some troublemakers escape unsuspected.

A new summing-up of all available evidence has just been published in book form by a botanist who has made hayfever pollens and the plants that produce them the subject of his life research, Dr. Roger P. Wodehouse (*Hayfever Plants*: Chronica Botanica Company). In it he lists not only the plants known to be the chief sinners against the peace of the human nose, but the lesser offenders also; and he performs a service for innocent suspects by showing up the paucity of the evidence.

Only half-a-dozen herbaceous families harbor hayfever weeds: grasses, composites (notably the ragweeds, of course), chenopods, pigweeds, plantains and docks. And there are only eight families of woody plants whose pollen makes nasal linings swell and eyes turn red; they range from birches and beeches through maples and ashes.

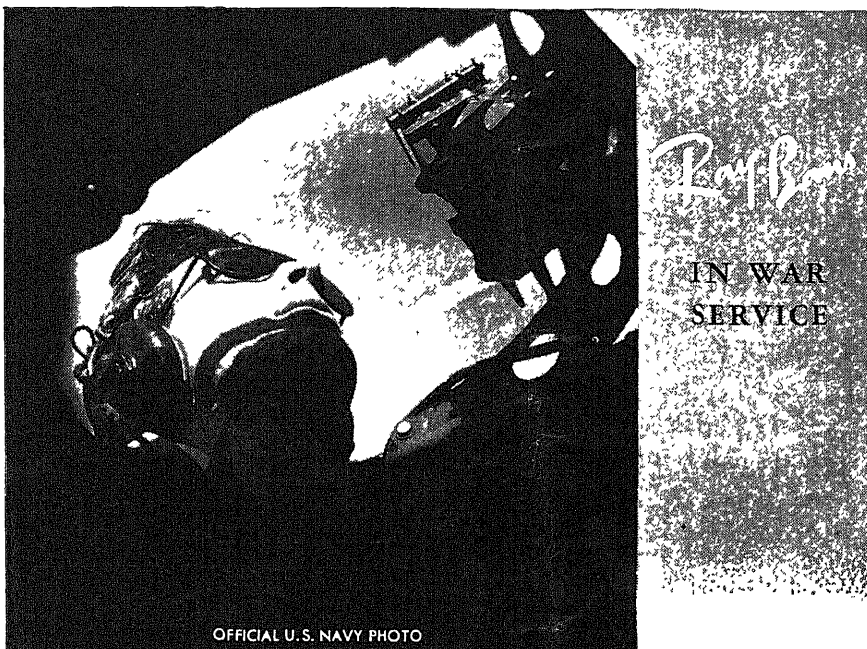
Even within any given family there are usually only a few irritating members. Thus, among the cockleburs, closely related to the ragweeds, only one or two species produce enough pollen to be worth bothering about. Again, while the English or narrow-leaved plantain is per-

haps the worst of the provokers of early hayfever, its two nearest relatives in this country figure hardly at all in it.

Mere abundance of wind-carried pollen does not suffice to convict a plant as an offender. Dr. Wodehouse points out that the whole great group of conifers—the pines, spruces, firs, etc.—cast enormous quantities of pollen to the winds every spring, yet only the sub-group comprising the junipers, cypresses and their

immediate kin, are known to be really troublesome hayfever causes. Again, while several grass species make many sneezes, the abundant pollens of sedges and cattails seems to be quite innocent. A pollen must be not only abundant and wind-borne, but specifically capable of causing the peculiar kind of poisoning known as allergy, to rate a place in the hayfever rogues' gallery.

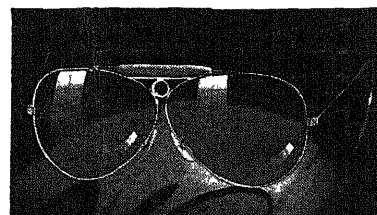
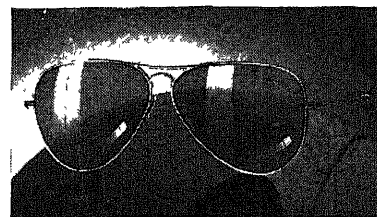
Science News Letter, June 2, 1945



Spotting the Enemy with RAY-BANS



In the top turret of a U. S. Navy Liberator this gunner spends hours upon hours of patrol duty—scanning the brilliant sky for enemy planes, while his crew mates search for submarines and surface craft. Ray-Ban Sun Glasses protect flyers' vision with cool, comfortable scientifically designed lenses and frames. Before the war, you saw Ray-Bans everywhere—at shooting ranges, at lake resorts, on the city streets. Today thousands of pairs of Ray-Bans are in use on the war fronts—protecting precious eyesight from punishing sun glare.



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AERONAUTICS

New French Planes

➤ FRANCE'S aviation industry is beginning to blossom forth, now that the Nazi war machine has been driven out by the Allies. Component parts of two airplanes were collected from their scattered hide-outs in barns and farm buildings near the Riviera.

Larger of the two airplanes is the Latecoere 631, a six-motor flying boat, with a twin tail that resembles the butterfly tail recently introduced into this country by Beechcraft. Re-erection of the plane was begun last September, and on March 6 of this year the 631 took off on its first test flight. While details of its performance are not available at present, results of the test were reported to be

excellent by the French Air Ministry, in a story appearing in *The Aeroplane*, (March 23), British aviation periodical.

The other airplane, the Bellatrix, a passenger and military transport, was completed and ready for a test flight in the spring of 1943. The German authorities refused permission to flight-test the plane, and eventually it was dismantled and hidden to keep it out of Nazi hands. The present model weighs about 24,000 pounds. Two Gnome and Rhone 1,260 horsepower supercharged engines thrust it through the air at a cruising speed of 240 miles an hour over a range of 1,240 miles. It will carry 22 soldiers and their equipment.

The production model of the Bellatrix will have a tricycle landing gear and 1,600-horsepower motors, and will weigh about 6,000 pounds more than the prototype. As a medium-range civil airliner, it can carry 23 passengers and a crew of four. It has a wingspan of more than 75 feet and the length is over 55 feet.

Due to the problem of transporting supplies and equipment over France's much-bombed rail lines, production of the new planes will be delayed. However, production of at least one prewar French aircraft is already under way. The Bloch 161 looks like the Douglas DC-3, now standard equipment on all American airlines, but has a twin tail and four engines. It is now being produced, and is

in service on French civil airlines. The four 1,050 engines give the plane a maximum speed of 267 miles an hour. The plane has a wingspan of 96 feet, 5 inches. It carries 33 passengers by day and sleeps 20 at night.

During the German occupation, French aeronautical engineers actively collected technical information from other countries, and quietly continued research work. The knowledge which they have acquired during the past five years will prove helpful to France in establishing herself after the war as a major factor in the aviation world.

Science News Letter, June 2, 1945

From Page 348

bodies slowly develop and before there were enough to destroy the blood of the baby, the infant might be taken by Caesarian operation and the child's life saved. So far, this has not proved successful.

It was even suggested that the mother might be de-sensitized to Rh blood in a way somewhat similar to the way a hay-fever sufferer is desensitized to ragweed pollen. This idea is still being tested.

But knowledge of the dangers of Rh blood is itself a partial defense. If an expectant mother knows that she has Rh negative blood and that her husband has Rh positive blood, her physician is in a position now to bring all the recent discoveries of modern medicine to her aid at the time of her baby's birth.

Science News Letter, June 2, 1945

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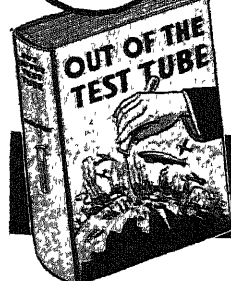
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Science News Letter, June 2, 1945

The Leningrad Institute of Applied Chemistry has developed a method of obtaining *Freon*, which previously had to be imported.

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Science News Letter, June 2, 1945

❁ **BREAST-PLATE** black-out lantern, when worn on the front of the body, casts a light downward toward the feet. It is a flashlight device with reflectors to direct the light to assist in reading messages or in walking, with no rays escaping upward or to the front.

Science News Letter, June 2, 1945

❁ **OFFICE CABINET** and drinking cup dispenser has several compartments for towels and lavatory equipment, and a separate compartment on one side to hold paper drinking cups. They are released one at a time by an adjustable device on the bottom; by turning a screw, cups of different sizes may be used.

Science News Letter, June 2, 1945

❁ **ROOFING** shingles are now made of rectangular pieces with their lower half of uniform thickness and their upper half wedge-shaped. The base of the wedge is in the center of the shingle and about triple the thickness of the lower half. The interlocking of the shingles gives a better roof.

Science News Letter, June 2, 1945

❁ **PATCHING DEVICE**, shown in the



picture, is used to seal bullet and shell holes up to four inches in size in gasoline and water tanks. It consists of a rubber ring of spongy synthetic rubber and a spring clamp. Two metal fingers grip the inside of the tank and hold the patch tightly in position.

Science News Letter, June 2, 1945

❁ **FULLY LIGHTED** cigarettes are delivered one at a time from a new combination container and lighter. By a slight mechanical movement a cigarette is released to roll into a tray where one end

comes in contact with an electrically heated coil.

Science News Letter, June 2, 1945

❁ **OLD RAZOR BLADES** clip the lawn in a home-made machine constructed by an ingenious American. An old vacuum cleaner motor, mounted in a box-like structure, powers a rotor with arms to which the blades are attached. An electric cord delivers the current to the motor.

Science News Letter, June 2, 1945

❁ **POWER-OPERATED** toothbrush is attached to the end of a special handle in which, by means of gears, a rotary motion is changed to a back-and-forward motion. The rotary motion is delivered to the mechanism inside the handle by a flexible shaft from a small motor.

Science News Letter, June 2, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 261

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IMPERIAL AGRICULTURAL RESEARCH INSTITUTE NEW DELHI 108231 MAY 45

Question Box

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OPTICS-PHOTOGRAPHY

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PHYSIOLOGY

How has it been shown that movies do not relax the body? p. 345.

PHYSIOLOGY—GENETICS

What does Rh positive mean? p. 346

PUBLIC HEALTH

What was the cause of a recent epidemic of diaper rash? p. 339.

Where published sources are used they are cited.

There are opportunities on the staff of Science Service in Washington for several persons. A staff writer in the physical sciences, engineering and aviation; a librarian with scientific knowledge and an understanding of information sources; and a person who desires to help build the science clubs movement.

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 9, 1945



Timid Sparrow
See Page 360

A SCIENCE SERVICE PUBLICATION

PUBLIC HEALTH

Overlooked Disease Cause

Rats may spread polio. At least 93 persons bitten in four years within an area of two square miles in Baltimore. Rats have a craving for human blood.

➤ **PHYSICAL** contact between rats and human beings may be a way, heretofore overlooked, in which such diseases as poliomyelitis and rabies are transmitted, Dr. Curt P. Richter of the Johns Hopkins Hospital, Baltimore, reports. (*Journal, American Medical Association*, June 2.) Dr. Richter calls attention to the large number of people who have been bitten by rats and the probably much higher incidence of actual physical contact.

At least 93 persons were bitten by rats during the four years from 1939 to 1943 within an area of less than two square miles in the city of Baltimore, Md. The Johns Hopkins Hospital, located within this area, treated 65 of these cases. Although 10.7% of them developed rat bite fever, none died as a result.

The age of the patients ranged from two months to 65 years, most of them (60%) being babies under one year of age. Persons were more apt to be bitten in heavily infested districts with poor housing and living conditions.

All of the people were bitten at night,

the hands and face being most frequently bitten as they are exposed during sleep. In many cases the bites did little more than puncture the skin and draw blood before the patients were awakened. In some instances, however, part of the face was chewed away before the rat was driven off.

Once having bitten a human being, Dr. Richter points out, the rats are apt to bite others. In one house four children and two adults were bitten within a short time. The first bite usually awakens the victim, however, and the rat is frightened away.

Rats have a real craving for fresh human blood, Dr. Richter's experiments showed. The human blood used to feed the rats was obtained from the hospital operating room. Whereas the average normal food intake of full-grown wild rats does not usually exceed 35 to 40 grams, 139 grams of fresh blood mixed with 8% citrate were consumed within less than 24 hours by two of the eight common Norway rats trapped in the city alleys and yards.

Science News Letter, June 9, 1945

yet reached so close to practical application. They illustrate, however, one of the tenets of the Foundation, that the same sort of advances in health, nutrition and medicine will come from fundamental research in biology as the great advancements in modern engineering which were based on understanding and application of basic physical and chemical principles.

The physiology of the development of mammalian eggs and embryos and the regulation of reproduction by hormones have long been studied by some of the personnel of the Foundation's staff, Dr. Hoagland stated. They are continuing this work in the direction of attempting to produce multiple young per birth in domestic animals—experiments which if successful would make possible substantial increase in the world's meat yield.

Hormones, the chemicals produced by the endocrine glands of the body, are being extensively studied in other aspects of their effects on living beings.

In a study of mental patients, coordinated changes in electrical brain wave activity and hormone reactions have been found to accompany changing psychiatric reactions in the patients.

Possibility that the acute fatigue suffered by patients with certain types of mental and emotional disorders may have a glandular basis is suggested by another series of investigations of hormone physiology.

This work started with the finding by the Worcester group that excretion via the kidneys of certain types of hormones, or chemicals derived from them, is different in persons suffering from cancer.

Later the Worcester group found that excretion of these chemicals which are derived from adrenal gland hormones, is greater in men who suffer most from fatigue when working under stress. This showed that the ability of men to withstand fatiguing ordeals is related to the functioning of the adrenal gland cortex.

The Worcester scientists next searched for a way to offset this. They found it in a synthetic chemical, pregnenolone. Daily doses of this resulted in improved target meter performance by healthy young men working under simulated flying conditions and improvement in production rates and waste savings by factory workers in operations involving incentive piece work pay.

Finally, scientists at the Foundation are slowly accumulating information about hormone action as a function of age which may help to prolong man's useful years.

Science News Letter, June 9, 1945

GENERAL SCIENCE

Hope of More Meat

An anti-fatigue chemical, and new ways to control cancer and mental disease also seen in researches at new scientific foundation.

➤ **HOPE** of increased meat production, an anti-fatigue chemical, and new light on the problems of cancer, mental disease and aging, may come from researches going on at a new scientific institution dedicated in Worcester, Mass., on June 9.

It is the Worcester Foundation for Experimental Biology, non-profit and educational institution supported in part by the community of Worcester and Worcester County and in part by grants from philanthropic foundations, industry, government agencies and private individuals.

Director of the new institution is Dr. Hudson Hoagland. Dr. Gregory Pincus

is director of the Foundation's laboratories at nearby Shrewsbury, Mass. Officers of the Foundation are: President, Dr. Harlow Shapley, director of the Harvard College Observatory, Cambridge, Mass.; Vice president, Rabbi Levi A. Olan, Worcester, Mass.; Secretary, Dr. Roy G. Hoskins, director, Memorial Foundation for Neuroendocrine Research, Harvard Medical School; Treasurer, Dwight E. Priest, president, Parker Manufacturing Co.; Assistant Treasurer, John Z. Buckley, treasurer, Parker Manufacturing Co.

More steak and chops will not be available this summer as a result of the Foundation studies. The experiments have not

GEOPHYSICS

Paricutin Is Laboratory

Quantities of buried vegetation are being studied as "fossils in the making" because of the possible similarity between them and ancient fossils.

➤ PARICUTIN, the world's youngest volcano, has already been put to work in the interests of science. This fiery infant, that sprang from the soil of Mexico only a couple of years ago, has buried quantities of vegetation under the thick showers of ash it has spewed up. Because of the possible similarity between the burial of these plants and that of leaves and stems millions of years old, now found as fossils in the western United States, Prof. Erling Dorf of Harvard University has been closely studying these "fossils in the making." He reported on his preliminary findings at the meeting of the American Geophysical Union in Washington, D. C.

True fossilization, which implies mineral impregnation of the wood, has hardly begun, Prof. Dorf stated. Not all plant materials fossilize equally well, so some plants will be preserved and others will vanish.

In general, plant remains were well preserved only if buried close to their parent trees and shrubs. Preservation was better where ashes showered out of the air than where leaves were embedded in mud formed from the ash under water. Offsetting this, however, is the greater likelihood of the first kind of burials being subsequently destroyed by erosion.

Greatest likelihood of complete fossilization and subsequent preservation, Prof. Dorf thinks, will be in ash deposits subsequently covered and sealed under by flows of lava.

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Dam Causes Earthquakes

➤ SMALL local earthquakes in the neighborhood of Boulder Dam have apparently been caused by the pile-up of water in the great artificial lake thus created. No harm to the dam or its auxiliary installations is anticipated, however, Dr. Dean S. Carder, seismologist of the U. S. Coast and Geodetic Survey, who has been making a five-year study on the spot for the U. S. Reclamation Service, reassured his colleagues at the meeting.

Great care was exercised, in selecting the damsite, to locate it on the most stable geologic formations available, and to avoid all known active faults. Really ac-

tive seismic regions in Nevada are well to the north, and the parts of California where major earthquakes have occurred are far to the west and southwest.

It was only to be expected, however, that the loading of a great mass of water into a hitherto empty canyon system would cause some slight earth movements. Total weight of water in Lake Mead, when it is full to spillway height, is approximately 40 billion tons. Withdrawals for power, irrigation, and city water supplies may reduce that by as much as eight or ten billion tons in a year. Low point usually comes in April, high water in July. The little quakes which Dr. Carder has been studying are most frequent when the lake is full.

Science News Letter, June 9, 1945

Storms Shake Land

➤ THERE is literal truth in the poets' old declarations that great storms at sea make even the firm earth shake. A scientific, quantitative study of the correla-

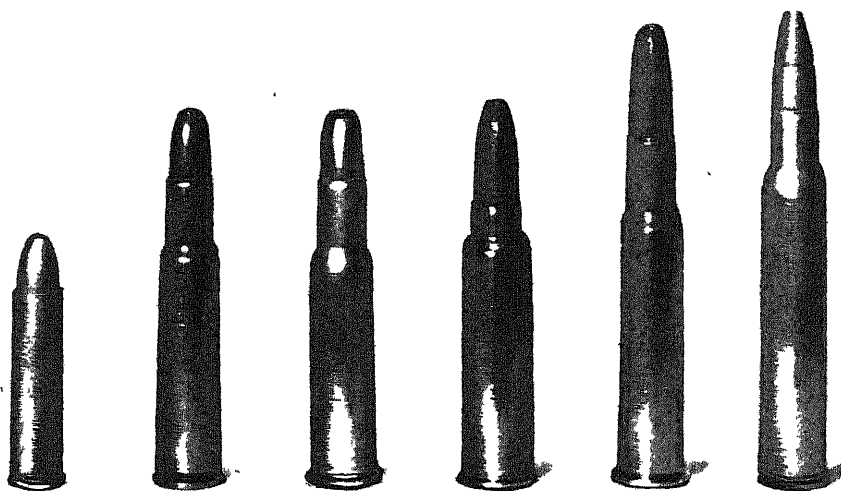
tion between sea storms and the almost imperceptible trembling of land masses known as microseisms was presented before the meeting by Leonard M. Murphy of the U. S. Coast and Geodetic Survey. Records of microseisms made at 13 stations in the United States, Alaska and Greenland, for three successive October-to-March seasons, indicated that the bigger and more intense the storm area the more marked was the earth trembling detected by the instruments, even far inland, Mr. Murphy told his audience. Storms off Newfoundland that recorded their passing on instruments in the United States failed to show up on the records of instruments in Greenland, and conversely, great storms off the Greenland coast did not register on the microseismometers in the United States.

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PHYSICS

Japanese Oxygen Mask Generates Its Own Oxygen

➤ A STRANGE type of oxygen mask that generates its own oxygen by electricity is part of the standard equipment of the Mikado's troops. Translations of instruction plates from an oxygen mask forwarded to the Air Technical Service Command at Wright Field reveal how the unique device works. Oxygen masks



VARY IN SIZE—These .30 caliber cartridges, pictured by the Western Cartridge Company, have only one thing in common: the diameter of all the bullets is exactly .30 inch. Everything else differs—weights of bullet and powder, length and shape of powder chamber, type of jacketing or no jacket at all. Each fits a different type of firearm. From left to right: cartridges for the Army's new carbine, Remington, Winchester and Savage sporting rifles, the Krag-Jorgensen rifle of Spanish-American War fame and the present-day M-1 (Garand) rifle.

used by American troops and flyers in high-altitude B-29 Superfortresses and other planes use compressed oxygen prepared at mobile oxygen-generating plants and stored in metal cylinders until needed.

One of the Japanese systems consists of six units, a battery, two electric buttons, a container for the oxygen generator, a gas meter, the mask and rubber tubing connecting the generator, meter and mask. Two special chemical oxygen generators are inserted in the container,

which is fitted with a metal door opening at the top. When ready for use, one of the electric buttons is pressed down, igniting the generator. Oxygen begins to flow in five seconds. After generation has once started it does not stop for 75 minutes. By using both generators, enough oxygen to last a man for two hours is produced. The meter tells the Nip fighter how much oxygen he is getting.

The Japanese also use the compressed gas system, and the chemical system may be used as an auxiliary.

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PHYSIOLOGY

Youth Can't Be Kept

Searchers for the fountain of youth in pills from the drug store are doomed to disappointment. Aging process involves more than decline in "sex hormones."

By DR. EARL T. ENGLE

Professor of Anatomy, Columbia University College of Physicians and Surgeons

➤ WHEN people reach middle age they begin to be fearful of growing old. They have no faith in the famous lines from Browning, "Grow old along with me! The best is yet to be," but make a frantic effort to regain their vanished youthfulness.

The magic in the words vitamins or hormones is attractive to many of this great group of our people. The advertising agencies and the facile and uninformed journalists do much to keep before the public the hopes that youth need not be lost, or once vanished, that it may quickly be restored.

At the present moment the so-called "sex hormones" are being exploited by the ready-worded writers. The term "sex hormones" represents an historical inaccuracy, which was quickly dropped by medical men, but is persistent in the lay mind. This group of substances, called steroid hormones by the chemist, contain among others two general categories of hormones. These are the estrogens, formerly called "female sex hormones," and androgens, once classified as "male sex hormones." This latter usage is repeated in the title of a new book. These estrogens and androgens are produced in the gonads, the ovaries and testes, and also elaborated by at least one other endocrine gland, the adrenal cortex.

The estrogens and androgens have considerable importance in causing the

development of the secondary sex characters in girls and boys, respectively, at the beginning of adolescence. They are not sex specific, however, since both are present in varying amounts in both normal men and women. Paradoxically the stallion, one of the most "masculine" of animals, produces an extremely large quantity of estrogens, the hormones formerly called female sex hormones.

Another connotation which is erroneous is associated with the word "sex" hormones. Sex may mean maleness or femaleness, but to most people sex means just what the boys in the smoking room mean by sex. It is in the latter sense that the word sex hormone is inaccurate. Sexual behavior in the human is a complex, as everyone knows, composed of acquired behavior patterns and of a very large and important psychological component. To a degree the hormones play a necessary part, but only a part in the behavior pattern. The functions of these hormones are not restricted to sex or reproduction but also are important in other physiological phases of the bodily economy.

While these hormones have an important role in the development of the bloom of youth, they do so only within the limits of the inherited constitutional qualities and the nutritional state of the individual.

The actual clinical use of these hormones is limited. They are used as insulin is used in diabetes or as thyroid substance is used in hypothyroidism, that is, when there is definite evidence of a lack of the appropriate hormone.

Thus androgen may be used in young men who have lost both gonads by surgery or disease. In women, particularly those who have reached the menopause or "change of life," either estrogens or androgens are widely prescribed by physicians to aid the woman in making necessary physiological adjustments incident to the cessation of menstrual life. This treatment is frequently most necessary in women of the younger age groups who have lost the ovaries because of disease or tumorous growths. Estrogens are frequently used in older men who have a cancer of the prostate gland. In such a

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seriously malignant disease, either the removal of all source of androgen or the administration of estrogen causes some amelioration of the pain and other symptoms of the patient. Such treatment is palliative only; it does not "cure" the cancer.

When androgen is administered to older men with diminishing sexual activity, the effect gained is usually more psychological than physiological. In the minds of many physicians there is always the knowledge that cancer of the prostate, referred to above, is at least activated by this hormone.

Estrogens and other steroids are frequently used in attempts to correct disorders of menstruation, though without marked or uniform success.

Thus the only clinical indications for the use of these hormones is where a distinct lack of the particular hormone is shown.

The process of growing old, and the loss of vigor of men and women, is more complex than a decline in estrogenic or androgenic hormones. The elasticity of the arteries and of the skin changes after middle life. The tone of the muscles and recovery from fatigue changes with age. Experimental medicine is greatly concerned with these matters, and many experiments have been made in the use of androgens and estrogens. Some of the experiments have been carefully and precisely done, with constant checking with that god of the experimentalists, the control experiment. A most useful control in such experiments is in the elimination of the power of suggestion. While men may "feel lots better and peppier" when being given androgen treatment, they frequently show just as marked improvement when being given an inert and harmless substance. They are better merely because they believe and wish it so.

And the woman who won't admit to 50 years and invests in hormone preparations to avoid the wrinkled cheek is being not only deluded, but is dealing in self-medication with a drug which is potentially dangerous.

The man past 60 who hopes to restore his aging arteries and consummate the dreams of by-gone years by using the chemists' magic steroid hormones will be, at best, disillusioned.

Workers in experimental medicine are interested in these problems both for their theoretical and their practical value. When new methods are found for preventing undesirable features of growing old, the public will then be told authoritatively. Until then, we will continue

the search instituted by Ponce de Leon for that limpid spring—but the source of that spring is not to be found in a

MEDICINE

Still Have Jaundice

➤ **ALTHOUGH** the great majority of soldiers who suffered from jaundice in connection with vaccination against yellow fever have probably fully recovered, about 12% of them still have some evidence of the liver disease.

Detailed study of a group of 200 soldiers returned from overseas because they had failed to convalesce satisfactorily is reported in the *Journal of the American Medical Association* (June 2), by Col. Julien E. Benjamin and Major Ralph C. Hoyt, of the Medical Corps, Army of the United States.

"As a group, they were pale, thin, exhausted and utterly devoid of animation," these medical officers report. "Their reactions, mental and physical, were slow and indifferent."

Part of the group were found to be suffering from a neurosis. In many cases, the men had been neurotic before the attack of jaundice or even before induction, or they had had a latent neurosis which was aggravated or brought on by the illness and the long hospitalization.

This group was greatly benefited by a carefully planned program of rehabilitation. They were put into uniform, became once again part of the armed forces and spent a portion of each day at the sports arena indulging in graduated games and calisthenics.

However, 37 patients, 18.5% of the group studied, were extremely weak and exhausted, and suffered from nausea and vomiting brought on by the first bite of food or by walking even a short distance. Fingers and feet were icy cold, yet it was not unusual to see perspiration actually dripping from the tip of each finger. Even the effort of shaking hands would bring on a tremor of the hands.

The medical officers term the weakness of these men as "devastating and overwhelming."

"For example," they report, "it was impossible for many to complete the writing of a postcard without resting at least once, nor could they dress themselves without noticeable exhaustion."

This group of 37 patients showed but little improvement under rehabilitation. They failed to gain in weight, and sweating of hands and feet was still excessive. The tremor remained constant. There

bottle of hormone tablets at the corner drug store.

Science News Letter, June 9, 1945

was, however, objective evidence of improvement in the liver functions and at the end of the period of observation, 23 had fully recovered in this respect.

Whether all will eventually recover completely, only further time will tell, the investigators conclude.

Science News Letter, June 9, 1945

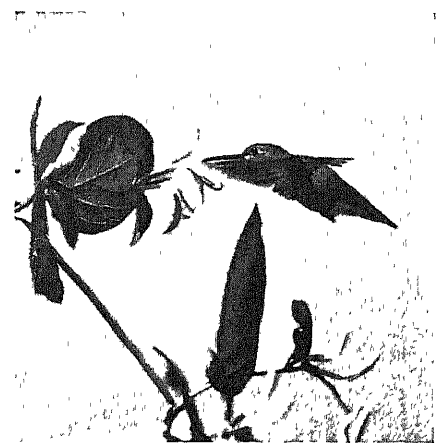
ORNITHOLOGY

Hummingbirds Must Learn To Get Food from Flowers

➤ **YOUNG** hummingbirds apparently do not realize that honeysuckle, larkspur and bird-of-paradise blossoms offer an inviting source of food until at least two weeks after they have left the nest, Frank Bene of Phoenix, Ariz., reports in the *Condor*, a magazine of Western ornithology.

The earliest acts of the young birds which bear any semblance to feeding behavior, Mr. Bene finds, are extension and retraction of the tongue, and probing twigs and leaves with the bill, at first while perched on a twig and later while hovering about it on the wing.

Hummingbirds seem to recognize flowers as a source of food only after



NOT BY INSTINCT—This black-chinned hummingbird seemed to recognize the honeysuckle blossom as a source of food only after it had acquired sufficient strength for sustained flight. Photograph by Frank Bene.

they have acquired sufficient strength for sustained flight. Before that, even though an adult would probe a blossom only a few feet away, the fledglings still made no attempt to search the flowers.

Only upon tasting the food can they decide whether or not they want it. Most hummingbirds prefer syrup made with white sugar, provided the solution is not too dilute. Commercial honey ranks next, but instead of taking long drinks, the birds only sip the honey-and-water mixture. Brown-sugar syrup is least desired, and salt water refused.

Several nasturtium blossoms with some of the spurs clipped were placed by Mr. Bene over the mouths of small vials and one ounce wine glasses filled with honey or brown-sugar syrup. When

the vials were hidden in the nasturtium beds so that the flower decoys could not be distinguished from genuine nasturtium blooms, the birds were surprised to discover the abundance of sweets they held. Thereafter these blossoms were sought in the nasturtium beds, the birds flying straight to the decoy.

A hummingbird can discriminate the color, taste and form of flowers, Mr. Bene believes, and through association learn to recognize and locate them.

Having once associated a place with a specific source of food, hummingbirds will return to the site although the food source has been removed. Apparently only one visit is enough for them to remember a place, a five-year-study of black-chinned hummingbirds showed.

Science News Letter, June 9, 1945

GENERAL SCIENCE

Soviet Science Celebration

A group of American scientists will attend the 220th anniversary of the Academy of Sciences of the U.S.S.R., June 15 to 28.

➤ A GROUP of American scientists will attend the 220th anniversary celebration of the Academy of Sciences of the Union of Soviet Socialist Republics to be held in Moscow and Leningrad, June 15 to 28.

Signalizing the return of scientific interchanges between the Soviet Union at peace and the United States, the visits of American scientists are expected to aid in the establishment of even closer relations in the coming months.

The American scientists will be the guests of the Soviet government and will fly to Moscow.

Science News Letter, June 9, 1945

Academy Celebration Includes Popular Festival

By IVAN KUZNETSOV

Soviet Scientist Antifascist Committee Writer

➤ The 220th anniversary celebration of the Soviet Academy of Sciences to be held late in June will, in addition to meetings, include a popular festival honoring the scientists of the U.S.S.R. and what they have done to serve their nation in peace and war.

The academy consists now of 145 academicians, including some of the leading figures in Soviet science, among them Dr. V. Komarov, botanist, who is

president, Dr. P. Kapitsa, physicist, Dr. N. Semenov, chemist, Dr. I. Vinogradov, mathematician, Dr. I. Orbeli, physiologist, and Dr. N. Burdenko, surgeon.

Fifty-seven institutes or sections equivalent to institutes are operated by the Soviet Academy today, with a total staff of more than 5,000 scientific and technical workers. The work is divided into eight departments: Physics and mathematics, chemistry, geology and geography, biology, technology, history and philosophy, economics and law, literature and language.

The academy is the guiding body in all Soviet research work and it is a sort of general headquarters for science where fundamental problems are studied.

Differing from foreign scientific bodies in organization and work as well as size, the U.S.S.R. Academy of Sciences is directly responsible to the Council of the People's Commissars. It renders an annual account of its work to the Council. The chief function of the academy is to promote pure and applied science in the U.S.S.R. and to study and develop achievements in world science. A fundamental task given the academy is to "apply all scientific achievements to the work of building up a new socialist classless society."

The academy was founded in 1725 by Peter the Great and soon became

Russia's authoritative scientific body. Most of the leading Russian scientists have been members, including Lomonosov, father of Russian science, the biologist Kovalevsky, the chemist Butlerov, the mathematicians Ostrogradsky, Chebyshev and Markov, and the physiologist Pavlov.

In 1725 the academy had 15 members and a hundred years later there were 22. In 1916, shortly before the revolution, there were 47 members and in 1925 when the 200th anniversary was celebrated there were 48 members.

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PUBLIC HEALTH

Suicide Rate in Germany Double What It Is in the U. S.

➤ IF MANY Nazi leaders killed themselves as some reports indicate, they followed a tendency that is much stronger in Europe than it is in the United States.

The suicide rate in Germany in 1936, the last year for which any reliable figures are available, was 28.6 per 100,000 population—just double the rate for the same year in the United States, 14.3.

The only European countries with suicide rates lower than that of the United States in that year were the Netherlands, with a rate of 8.1; England and Wales, 12.3; Romania, 10.5; Norway, 6.3; Eire, 3.3; and Italy, 7.9. It is believed that the low rate in Eire and Italy may be accounted for by the large Catholic population; the Catholic teachings are very strong with regard to suicide and burial in consecrated ground is refused to those who are known to have deliberately killed themselves.

If the effect of war is the same in Germany as it generally is in other countries, however, it is probable that the suicide rate is lower there now than it was in 1936. The first World War caused a drop in the German suicide rate. From a rate of 23.1 per 100,000 in 1913, it dropped to only 15.3 in 1918.

The U. S. suicide rate has dropped in the present war to 10.2 in 1943, the latest available Census Bureau figure.

Japan, contrary to popular belief due to the practice there of the traditional hara-kiri, has only a moderate suicide rate. In 1936, the rate was only 22.0 per 100,000. The rate in Austria was 40.2.

But even in countries where the suicide rate is highest, self-murder does not compare as a cause of death with the most serious diseases. The U. S. death rate from cancer in 1936 was 111.4.

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ENGINEERING

Better Sound for Movies

Is possible through loudspeaker systems that are more efficient, give better performance and eliminate rear radiation resulting in higher overall quality.

➤ NEW and improved sound for motion picture theaters is possible through loudspeaker systems that are more efficient, give better performance, and eliminate rear radiation from the speaker resulting in higher overall quality, J. B. Lansing and K. K. Hilliard, both of Altec Lansing Company, reported at the meeting of the Society of Motion Picture Engineers in Hollywood.

The loud speakers described employ new metal diaphragms and voice coils that are superior to those used in the past, and new Alnico Type 5 permanent magnet with magnetic circuits of very low leakage. The diaphragm and voice coil assembly is mounted in such a manner that it can be removed for replacement purposes without discharging the permanent magnet field, the authors stated.

Mr. Lansing also revealed details of a new duplex public address system for theaters that combines a low-frequency unit and a high-frequency unit into a single speaker with a total combined frequency range of from 40 to 15,000 cycles over a wide angle. The efficiency of this unit in converting electrical power into acoustic energy is very high and the unit is capable of producing high-quality sound at high power, he declared.

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Simpler Film Filing

➤ AMATEUR movie fans who have so many reels of film that the location of any one particular scene in a film presents a special problem may get a few good ideas from Carl M. Effinger, of 20th Century Fox Film Corporation, who reported to the meeting a new filing and cataloging system for motion picture films. The system, as described, replaces the card index system and is streamlined, simplified, and visual.

The secret of the system is a loose-leaf catalog. Each loose-leaf page is divided into seven sections with a hole, the shape and size of one frame of motion picture film, cut into the page at each section. It is a good deal like a snapshot album, with seven single frames and a description of each on a single page. Since amateurs use 16-millimeter film they could

probably get more frames on one page than the movie studios, which use larger 35-millimeter film.

Only similar scenes appear on any given page, such as ships, excursion day, trains, streets, and so on. At the top of each page is an exact breakdown summary of the shots on the particular page, so that you can tell at a glance where the shots in a particular category are located.

Each item is keyed to a particular spool of film, so that the librarian can instantly locate the desired sequence. One of the most desirable features of the film catalog system is its compactness. Stored in two medium-size safes, 36 volumes catalog completely over 22,000,000 feet of film, he pointed out.

This same method was to have been adopted by the U. S. Government in cataloging war films in the United States War Film Index Library, Mr. Effinger stated.

Adapted to amateur use, it would make it possible for the movie fan to keep a complete record of all the pictures he has taken, and to locate quickly any desired shot, without having to run through hundreds of feet of film. Not only would this be helpful in editing his own home movies, but the film catalog makes an excellent album for recording a picture-taking career.

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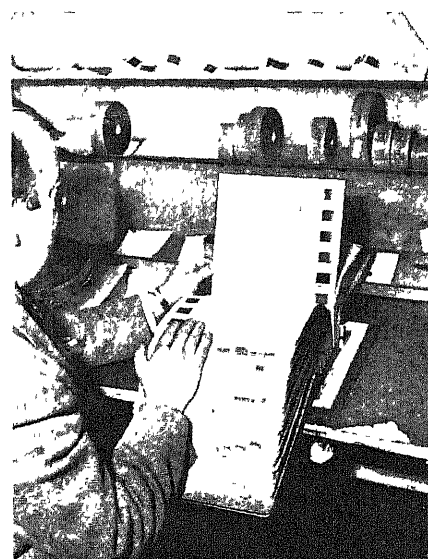
PUBLIC HEALTH

Predict TB Death Rate Will Be Halved in 1960

➤ ONLY about 20 people in every 100,000 in the United States will die from tuberculosis in 1960 if the present rate of improvement continues, statisticians of the Metropolitan Life Insurance Company estimate.

At present about 40 in every 100,000 die from tuberculosis, while in 1921 about 100 per 100,000 died from this disease which caused the death of almost 200 in every 100,000 at the beginning of the century, according to the U. S. Bureau of the Census.

For more than four decades the mortality from tuberculosis in our country



FILING FILM—This new system makes it easier to locate any particular scene in a film. A loose-leaf catalog is used, with each page divided into seven sections. A hole, the size and shape of one frame of motion picture film is cut into the page at each section.

has been sweeping downward without interruption. The current death rate from the disease is only about one-fifth what it was in 1900.

From 1921 through 1943 the death rate decreased on an average by 4% annually. This means that the absolute annual decline was less each year, but it should be remembered that as room for improvement diminishes, it becomes increasingly difficult to make further gains.

We may expect a death rate of only about 30 persons each 100,000 in 1950 if the decline in deaths from this cause continues at the same rate as in the period from 1921 to 1943, the company statisticians state. They believe, however, that the actual figures may be even lower than those indicated by the forecast.

An important step toward combatting this disease was the establishment, last July, of the Tuberculosis Control Division in the U. S. Public Health Service, whose function is to develop, on a nationwide scale, more effective measures for the prevention, treatment and control of the disease.

The new program will give added impetus to the widespread use of X-ray mobile units for mass surveys, an incidental advantage of which will probably be the discovery of other diseases.

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ORNITHOLOGY

Grasshopper Sparrow Is Little Known Bird**See Front Cover**

➤ THE TINY grasshopper sparrow, like the one on the front cover of this SCIENCE NEWS LETTER, is one of the commonest sparrows in the eastern part of the United States, yet it is one of the least known because of its seclusive habits and its thin, insect-like song. Its high-pitched song of "zee-e-e-e-e-e" can be heard for only a distance of several hundred feet. This song gives rise to the name of grasshopper sparrow.

It lives in old dry grassy fields and will not take wing until almost stepped upon. When it does fly, it seldom rises higher than a few feet above the ground. Its favorite singing perch is on a fence rail. Its nest is rarely found because it is cleverly concealed under the grass. The bird avoids giving a clue to the location of its nest by entering the area through a long and devious pathway in the grass.

The unusual photograph on the cover was taken by George A. Smith of Quarryville, Pa., by synchronized flash, and by remote control with a miniature camera placed within two feet of the nest.

Science News Letter, June 9, 1945

PHYSICS

Fiberglas Mats Valuable In Several Applications

➤ FIBERGLAS mats, developed originally for use in storage batteries, are now found to be valuable in several other applications. They are employed with success for wrapping underground oil, gas, and other pipe lines to protect them against electrolytic action and corrosion; as a base for a new plastic laminated material; and as a base material for gaskets and sheet packing. These mats are made by the Owens-Corning Fiberglas Corporation.

Glass fibers are non-corrosive to metals and have negligible moisture pickup. The mats of this material can be wrapped around bitumen or coal tar-coated pipe, thus forming a continuous water-tight bond. The tensile strength of the material withstands a wide range of temperatures, and exposure to organic solvents and soil acids.

The new plastic laminated material in which "fiberglas" is used, has many electrical uses because it possesses a low and stable loss factor over a wide wave frequency range. It is employed in plastic

coil forms, condenser spacers, stand-off insulators, and in radio, television and other high-frequency electronic devices.

In the base material for gaskets and sheet packing, the mat acts as a carrying medium for synthetic resins suitable for applications requiring resistance to heat, oil and acids. The gaskets show high pressure resistance, chemical durability and little flow under flange pressure.

Science News Letter, June 9, 1945

MINERALOGY

Industrial Diamonds Cut With Electric Arc

➤ CUTTING industrial diamonds with an electric arc, a new process just discovered at the National Bureau of Standards, increases the rate of cutting from double to four times that of present methods. The discovery is perhaps the greatest real advance in the technique of cutting diamonds since the art was first practiced hundreds of years ago.

Two scientists of the Bureau are responsible for the new method, C. G. Peters and Karl F. Nefflen. They find that they are able, with the electric arc method, to double the cutting rate when the cut is in the most favorable direction as regards the crystal axis, and to increase the rate about four times for the least favorable direction.

The electric arc is formed between the diamond and the cutting lap. Messrs. Peters and Nefflen connect the secondary terminals of a 5000-volt power transformer to the dop that holds the diamond and to the rotating lap. When an alternating current of 110 volts is applied to the primary of the transformer and the current adjusted to about half an ampere, a small blue arc is formed at the contact of the diamond and lap.

They have also found that by applying the arc to a diamond saw, the sawing rate is greatly increased, so that diamonds can be saved regardless of the orientation of the cut with reference to the crystal axes.

The method for cutting plane surfaces or facets on diamonds, used universally since the earliest records, has been to place the stone in contact with a flat cast-iron lap charged with diamond powder and rotated at about 2000 revolutions per minute. As a general rule, cutting is most rapid when the plane of the facet is parallel to one or two of the crystal axes of the diamond and the direction of motion of the lap surface is parallel to one of the axes.

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ORNITHOLOGY

Bright-Plumaged Birds Sent from Costa Rica

➤ THE NATIONAL Zoological Park in Washington has a good neighbor far off to the south, in the Central American republic of Costa Rica. He is Alejandro Caballero Gamboa, of San Jose, who has sent half-a-dozen of the brightest-plumaged birds ever received in the capital. The collection consists of one honey-creeper, a pair of blue-hooded euphonias, and two Costa Rican chlorophonias, and one bird as yet unidentified. Luis Maiden, a geographer now conducting field studies in Central America, acted as intermediary in transmitting the birds.

The National Zoo is also rejoicing in additions to two native North American families. There are two new cubs in the mountain lion's den, and two in the cage of the red fox.

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HORTICULTURE

Cornell Has Roses With Stems 20 Inches Long

➤ ROSES are sold by stem length—the longer the stems, the higher the price.

On this basis, Cornell University probably has the most expensive roses being grown, for the average stem length is 20 inches, as compared with 12 to 15 inches in the commercial trade.

The Cornell specimens also have from 35 to 40 flowers per plant, whereas commercial production averages less than 30 flowers per plant.

The reason lies in better fertilizer concentrations and close attention to watering. A higher soil moisture content is carried, for example, than in most commercial production.

The rose plants are grown in benches. No fertilizer is lost. Water that leaches from the soil is caught in the crocks and returned to the soil in the next watering. Thus the soil nutrients are saved and used again.

Many experiments on rose growing are underway in the floriculture department's greenhouses—on soil moisture, watering both by hand and by automatic methods, and nitrate studies.

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THE FIELDS

CHEMISTRY

Fuel Substitute Is Better Than Gasoline

➤ A NEW fuel substitute for gasoline that gives one-fourth more power in a properly designed internal-combustion engine is reported by Donald B. Brooks of the National Bureau of Standards. A blend of certain non-hydrocarbons, the fuel, if used in an ordinary gasoline engine may give up to 5% more power than gasoline, he stated.

The components of the new blend are ethyl alcohol, diethyl ether, acetone and butanol. These can also be used "straight" in some cases, Mr. Brooks stated. His conclusions are based upon tests of substitute motor fuels conducted in a precision single-cylinder variable compression engine in the Bureau's automotive laboratory at the request of the Foreign Economic Administration of the Office for Emergency Management.

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PSYCHOLOGY

Average Newborn Baby Cries 113 Minutes a Day

➤ THE AVERAGE newborn baby cries for 113 minutes a day.

This, according to an editorial comment in the *Journal of the American Medical Association* (June 2), "is more than should be necessary for the normal use of the cry as a signal of need."

The baby bawling was clocked in the nursery of a maternity ward by Dr. C. Anderson Aldrich of the Mayo Clinic and his associates.

The calmest hour of the nursery day, they found, is at 10 a.m.—a time when the nursery is fully staffed, the babies fully fed, and "the smaller needs of the infants were more completely satisfied."

The noisiest time comes between 10 p.m. and 2 a.m.—when there were only two student nurses to take care of 30 babies.

From this and other data on crying the physicians conclude that hospital routine and the distribution of nurses through day and night should be adjusted to the community needs of the infants.

Despite the offhand impression of parents of twins, it was found that crying

does not seem to be contagious from one baby to another.

"The chances are less than 0.14%," the doctors figure, "that more than half of the babies in the nursery will be crying simultaneously."

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HOME ECONOMICS

Cake Crumbs, Dried Fruit Make Sugar Go Farther

➤ CAKE CRUMBS and dried fruits can be used to make sugar supplies go farther. Honey, molasses, corn or maple sirup may be used instead of sugar in baking.

Extra juice saved from canned or cooked fruit may be used in sauce for puddings and fritters; to moisten and sweeten crumbs for brown betty and sweeten and add flavor to gelatin desserts, point out food specialists of the War Food Administration.

Crumbs saved from cake and cookies cut in half the amount of sugar needed for bread puddings.

Marmalade, jam or preserves spread on warm cake make an excellent substitute for cake frostings and fillings, which call for considerable sugar. Sheet cakes require only half as much frosting as layer cakes.

Fillings for pies, turnovers and tarts can be made with steamed dried fruit, rich in natural sugar. A good filling for layer cake is made of chopped dried fruit, mixed with nuts and moistened with honey or corn sirup. Fill baked apples or pears with raisins and sirup or honey instead of using sugar.

Fresh fruits should be served as dessert frequently, especially during the summer months. Fruit salad may also replace a sugar-consuming dessert.

A bit of salt, added to the cake frosting, pie filling or pudding, accentuates the sweetness. Less sugar is needed to sweeten cooked fruit if it is added after instead of before cooking.

Corstarch or tapioca cream pudding may be made with half the usual measure of sugar if a tablespoon of sirup is put in the bottom of each serving dish before filling with pudding.

These hints will be especially helpful in feeding crowds at community picnics and large suppers this summer. Assembled by industrial feeding specialists of the War Food Administration for the use of chefs and dietitians in restaurants, cafeterias and hospitals, they will help your own sugar supplies last longer.

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ENGINEERING

Norden Bombsight Is Really Master Robot

➤ LONG one of the major secrets of World War II, the Norden bombsight is disclosed as a complex mechanism that rapidly shows the bombardier where and when to drop his bombs. In its operation it solves two problems in trigonometry, makes other mathematical computations, and finally takes over the job of the pilot on the bombing run.

The essential parts of the Norden sight are a gyro-stabilizer, computing machinery, and an optical system in which is installed a mirror attached to a variable speed motor.

In operation, the bombsight measures the rate of change between two imaginary lines, one of these lines is the equivalent of a plumb line hung from the plane. The other is the constant line of sight to the target, maintained by the mirror. The angle at which this mirror is tilted changes as the plane approaches the target.

By viewing the target through the sight, then setting the knobs which control the computing mechanism and switching on the automatic pilot, the bombardier is ready to drop his bombs. He does not necessarily have to keep his eye on the target once this is done, for a pointer, mounted on the sight, shows him the exact moment when he should drop his packages of destruction.

Science News Letter, June 9, 1945

INVENTION

Fire-Alarm System for Airplanes Insures Safety

➤ GREATER safety for air travellers of the future is sought in a new fire-alarm system, on which U. S. patent 2,376,920 has been issued to Harry S. Jones of East Orange, N. J. Rights in the patent are assigned to Thomas A. Edison, Inc.

Since any fire-alarm system intended for use on planes must endure a good deal of buffeting and exposure, the basic design must be simple. Mr. Jones' device meets this requirement; its basis is the well-known principle of the thermocouple, in which a pair of unlike metal pieces have their electrical properties changed by heat. A ring of thermocouples, connected by a cable, is secured to the firewall directly behind the engine. If a fire occurs, the current within this ring, stepped up through a relay, sounds the alarm.

Science News Letter, June 9, 1945

ENGINEERING

Sound on the Record

New and improved methods, developed in recent years, will mean better recordings for longer periods of time and at lower cost after the war.

By ROBERT N. FARR

► RECORDING sound by new and improved methods, developed since the industry began to expand in recent years, will mean better recordings, for longer periods of time and at lower cost after the war.

Generally speaking, today's recording devices fall into three groups; those that record mechanically, like a phonograph record; those that record magnetically, like the magnetic wire recorder; and those that record photographically, like sound movies. Probably the most faithful reproduction of sound can be secured by the photographic method, since there is no mechanical distortion, but other types of equipment are being studied and improved, so that soon they may be equal to or better than photographic recording.

What are these new recording devices? How do they work? Will they play an important part in postwar business and entertainment? Well, here are some of the answers.

Those small, compact units which record on spools of cellulose tape, movie film or wire, are the latest developments in recording equipment. You can record voice, music, or any other sound for several hours with almost any of these devices at a cost of a few cents an hour. They are an improvement over recording on phonograph discs which limit recording time to 15 minutes or less, depending upon the diameter of the disc used.

One of these devices, the so-called "continuous sound recorder," records on either cellulose acetate or ethyl cellulose tape, the width of 8, 16, or 35 millimeter movie film. One to five hours of recording is possible with film recorders which emboss, side by side, as many as 15 sound tracks on the entire length of the film.

High Speeds

Using various types of microphones, sounds are picked up and converted to mechanical pulsations which cause a jewel needle to vibrate on the surface of the film which moves at speeds of 40, 60, or 90 feet a minute, leaving an embossed record of the sound in the film strip.

High speed is necessary so that all tone variations will be recorded. By re-winding the film, which is spooled on reels like movie film, the sound can be reproduced through an amplifier, using a magnetic pickup fitted with a jeweled stylus similar to that found on the best electric phonographs.

Jewel-tipped needles are used because jewels such as diamonds, sapphires, and rubies are harder than steel and resist wear over a longer period of use. When a needle becomes worn, it develops ridges in its outer surface which leave an imperfect record of sound on the film or disc, and cause mechanical surface noise when the recording is played back.

Record Any Sounds

One continuous cellulose tape recorder now in wide use with the armed forces and by the government was developed by William Wolf and is called the Recordgraph. Another similar device was invented by J. C. Fonda, ex-Hollywood cameraman. Mounted in a single case, containing both recording and reproducing equipment, the units weigh less than 50 pounds. They can be used to record any sounds, operating on 110 volts, 60 cycle alternating current, or with adaptors, any other type of current.

The Recordgraph, which embosses sound on film with a sapphire-tipped needle, was used to record a report of the Normandy Invasion and the first B-29 raid over Tokyo. These recordings were broadcast over the entire world.

You can start the Recordgraph by turning on the current and speaking into the microphone. An automatic switch starts the machine when sound begins to come over the microphone, and stops the recording when the sound stops. With this device it is possible to record under conditions of extreme vibration, and you can record with the machine in an upside-down position. A new-type volume control automatically prevents booming sounds, such as roaring gunfire or the zoom of planes, from drowning out other sounds. This is accomplished by compressing loud sounds with an electronic amplifier.

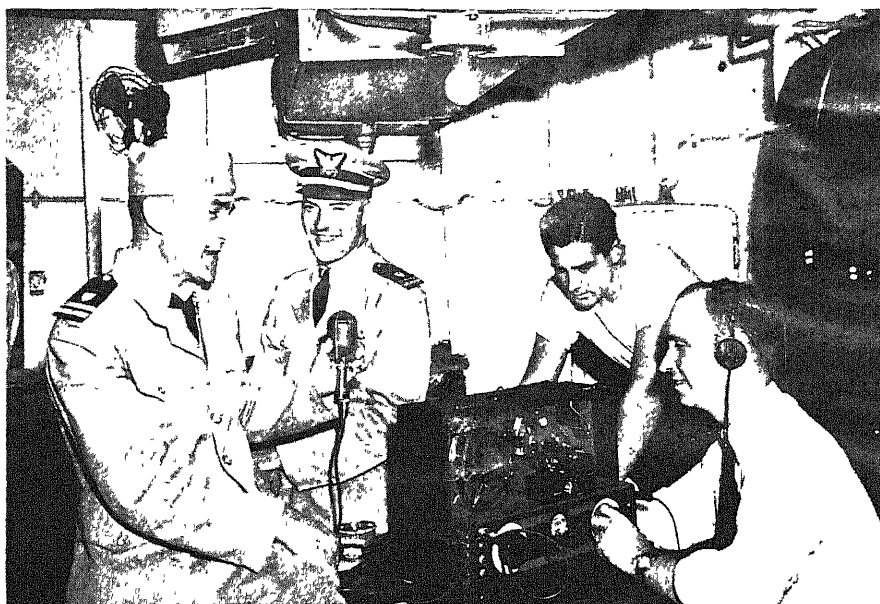
Still another similar recorder is known

commercially as Millitape. A coating of black gelatin is put on standard eight-millimeter film, making it opaque. Millitape uses a sharp pointed recording needle which cuts through the coating, leaving a transparent sound track where the needle has passed. The recorded sound is reproduced by running the film between a beam of light and a photoelectric cell which converts the visible sound track into electric impulses, which are in turn amplified and reproduced through a loud speaker.

Recording on film by the mechanical methods described above is probably the most economical way to permit you to make permanent recordings that can be played back immediately. The big disadvantage is that duplicate copies cannot be made without re-recording on new tape, using the original film as a source of sound. Re-recording devices are expensive, costing from \$600 to \$1,500, yet, even at such high cost, they are less expensive than many other types of recording devices that give comparable quality of sound recording and reproduction.



USES WIRE—This portable pocket model of the magnetic recorder can be carried around with you to keep a permanent record of interviews, important events and even concerts.



RECORDS HISTORY—Important events are recorded vividly in the words of the men who make them by a cellulose tape recording device. One of many kinds of recorders to be available after the war, this instrument can record up to five hours without stopping on 35 millimeter film.

Probably the most recent development in recording is the magnetic recording of sound on a spool of steel wire 0.003-inch thick, almost as fine as a human hair. The idea was based upon the invention of a Danish professor, Valdemar Poulsen, in the late 19th century, and has only recently been perfected and produced commercially.

The wire is drawn at a speed of 1.25 feet a second past the iron cores of a set of coils, and speech or sound current, passed on from the microphone, is converted into a magnetic pattern on the wire. When the wire is drawn past a set of reproducing coils, current induced by the magnetic pattern is picked up by the coils and converted into sound through an amplifier and loud speaker.

Sound can be wiped off the wire, so that it can be re-used almost indefinitely,

by passing it through a magnetic field that neutralizes the magnetic pattern. Any part of the wire can be erased without harm to the sound recorded on adjacent parts. If the wire breaks, it can be "welded" together by tying the two ends and applying the heat of a cigarette.

The wire is unaffected, so far as sound is concerned, by temperatures and humidity conditions that might ruin cellulose tape or film. The unit is comparatively unaffected by external vibration and severe shock.

The unit is small, compact, and expensive. Some 15 commercial firms, including Armour Institute, General Electric, Stromberg Carlson, and Raytheon are experimenting with postwar applications of the device. One version is a three-pound battery-operated recording unit in a plastic case that can be carried around like a small camera. Using a lapel or hand-held microphone, up to one hour can be recorded on the 1,720 feet of wire on a reel in the unit. An automatic device prohibits further recording when the end of a spool is reached. Another magnetic wire recorder, called Soundex, employs two darning needles as the magnetic poles for setting up the sound pattern on the wire.

The main problem today with the magnetic wire recorder is that the wire has to move at a speed of about 225 feet a minute to pick up sound so that faith-



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ETHER AND MATTER

by **C. F. Krafft**

The above book of about 160 pages with 50 diagrams and 6 tables is now with the printer, and will be released for one dollar a copy (the actual cost of printing) as soon as the copies are obtained from the printer. In the meantime the writer's earlier publications ("Essays on the New Vortex Atom") may still be obtained free of charge.

C. F. Krafft

1322 Amherst Ave. Richmond 22, Va.

At all bookstores, or
RUTGERS UNIVERSITY PRESS
New Brunswick, N. J.

Do You Know?

There are 1,200 military uses for lumber, it is estimated.

Oklahoma leads the United States in the production of broomcorn.

Alcohol is being made from waste and surplus bananas in Jamaica.

Chemotherapy, the internal treatment with chemicals, is being used to combat Dutch elm disease in Connecticut.

Fifty different enzymes, all proteins, are known to be present in skeletal muscle.

The catch of lobsters on the coast of Maine last year was 14,500,000 pounds, the largest since 1892.

Turkey hens normally produce from 40 to 60 eggs during the spring months, and few if any during the other months.

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ful reproduction will result. At present the wire moves at a speed of 75 feet a minute. At the higher speed for good recording, you would need 9,000 feet of wire for 40 minutes of sound. Even with very thin wire, such lengths make the spools bulky, and the cost of Swedish steel wire, needed for best results, is high.

The motion picture industry uses either the RCA Photophone or the Western Electric systems to record sound on film. These processes are entirely photographic and eliminate mechanical distortion caused by needles and surface noise.

A beam of light, passing through a slit made by two pieces of metal which vary in width depending upon the sound picked up by the microphone, flashes upon the film "dashes" of varying width. This is the Western Electric variable density method of recording sound photographically.

Variable Area System

The other method is called the variable area system, and is used by RCA Photophone. In this case the intensity of the beam of light, projected on an oscillating mirror, throws a solid blot of light on the film which varies in area depending on the sound current from the microphone.

In the sound motion picture projector, when the sound track printed beside the pictures is passed between a beam of light and the photoelectric cell, the variations in area or density are converted into electrical impulses which in turn create sound waves in loud speakers mounted behind the screen.

The photographic method of sound reproduction is not suitable for immediate play-back, since the film must be developed and printed like motion pictures before it can be reproduced.

Recording sound was done by Edison in 1876 on a cylinder, but the modern disc or platter was the idea of Emile Berliner. Today, about 90% of the recording done is on these record discs similar in shape to the phonograph records that you buy at music shops. The discs themselves are made of cellulose acetate or vinylite resin spread thinly over a disc of glass, aluminum alloy, or paper composition.

Aluminum alloy discs are also used for recording without any coating. Very sharp steel alloy or jewel-tipped needles cut into the surface of these records at recording, leaving a spiral sound track. Since they require no processing, disc recordings can be played back immediately.

Modern recording equipment for "canning" sound on discs consists of a turntable like that on a phonograph, a recording needle mounted in a "recording head" and a pickup for playing back the recording. The recording head is connected to the microphone through an audio frequency channel, while the pickup is connected to a loudspeaker through an amplifier. The records you play on your home phonograph are usually 10 or 12 inches in diameter and run at a speed of 70 revolutions a minute.

There are two ways of cutting a sound track on a disc record, lateral or vertical. The vertical method was employed by Thomas Edison in the first recording machine which he built. The indentations of the cutting needle are impressed on the floor of a groove in the record so that the sound track resembles a continuous stretch of hills and valleys caused by varying impressions of the needle on the acetate.

The early disadvantage of vertical recording was that in playing back the record, the pickup needle would jump from the top of one hill to the crest of the next, skipping the valley. Recently, however, Western Electric has overcome this by suspending the playback needle arm so that the needle itself carries no weight, and follows the true pattern of the groove.

Emile Berliner developed the lateral method of recording. By his method the needle cuts into the side walls of the sound track so that (Turn to page 366)



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proud of its wartime record in carrying tremendously increased numbers of passengers in spite of shortages of equipment, parts and skilled help.

The war has brought home how important a part gasoline plays in the transportation system of this nation. We, of Ethyl, are glad to have been able to contribute to the improvement of engines and fuels and look forward to continuing cooperation with both manufacturers and operators in the future.



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From Page 364

instead of a vertical movement, the needle moves from side to side. On this type of record, microscopic examination shows that there are no hills and valleys as in the vertical record. All recording equipment in use today, except that made by Western Electric and Fairchild, uses lateral recording. Both types of recordings can be played back on any good reproducing machine.

Professional disc recorders are produced by Presto, Fairchild, and Speak-O-Phone and others in portable units mounted in suitcases. Many manufacturers, including RCA, Scully, and Presto make professional studio equipment for stationary permanent installation. Home recording devices are manufactured by Wilcox-Gay, RCA, Emerson and others.

One of the latest developments in disc recording and reproducing is a sound pickup device for playing back recordings that rides in the groove of the record, eliminating entirely the pickup arm which heretofore held the needle. It con-

sists of an L-shaped metal weight with a felt pad to protect the record on one branch of the L, and the needle with an electrostatic pickup on the other branch. Wires run from the device to the detector and amplifier. In operation, the device is set in the outside groove of the record by hand and, riding the groove, it travels the spiral path toward the center of the record. Supported only by the record itself, it picks up mechanical impulses as it moves along, which it converts into electrical impulses and then to sound.

Another new device is the Sound-scriber, designed for office use. Employing an eight-inch vinylite resin disc, it will record up to 30 minutes of voice at slow speed. It can be used to record dictation, important telephone conversations or conferences. The records are small and unbreakable, so that they may be conveniently filed in a correspondence file for further reference. The big disadvantage of this otherwise handy device is that it records so many sound tracks so close together on the small disc that while the words are understandable, the voices do not bear much resemblance to those of the speakers.

One of the most recent combination recording devices, called "Radiotone" commercially, has been developed for the use of schools, industrial plants and institutions. This unit combines a radio, recording device of the professional type, and a public address system. Built by the Robinson-Houchin Optical Company, it may be used to record programs off the air from its built-in radio, from the public address system, or in the regular manner.

A fourth development, recently patented, is a recording device that will answer your telephone while you are away from home, record any message that the caller leaves, and play to the caller a recording of any message you wish to leave for him. It consists of two or more turntables mounted close together. Any turntable may be used for recording or reproducing. When your telephone rings, the vibrations of the bell actuate a detector which connects the telephone to the apparatus. The reproducing pickup is lowered to the record you have recorded and your message is played for the caller. Then a gong rings, and the caller is instructed to begin giving the message he wishes to leave for you.

Science News Letter, June 9, 1945



Thorns and Thistles

➤ WEEDS have been recognized as the gardener's worst enemies ever since the first garden was dug. "Thorns also and thistles shall it bring forth to thee," was the heart of the curse imposed on Adam; cause enough that he should eat bread only "in the sweat of his face." And no gardener since that luckless arch-ancestor has been able to evade the burden of hoeing or pulling up weeds.

Wherever man has gone, his weeds have gone with him. We know little enough about the origin of our field and garden plants; most of them came into cultivation before the beginning of written history, so that records are in the very unsatisfactory state of having no beginning. And, naturally enough, we know even less about those illegitimate waifs, the weeds, than we do about the more favored children of our gardens.

We have been able, though, to get some idea of how adept weeds are at stealing rides into new territory from the way they travelled into the New World when our European ancestors came over here. They brought with them a large proportion of our common garden and field crops: lettuce and rad-



WYOMING

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The 900-acre Paton Ranch will give you trout-fishing in a mountain stream in the foothills of the Big Horn mountains, daily horseback rides along picturesque canyon trails and excellent food—most of which is grown on the ranch.

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ishes, peas and carrots, wheat and oats and rye, all came along with the white settlers; and so did pigweed and purslane, thistle and dandelion, velvet-leaf and jimsonweed and wild mustard, and others whose name is legion.

They arrived in all sorts of ways. Many, we may be sure, smuggled themselves in with supplies of garden and field seeds. Seed inspection, to keep such contaminants out of commercial seed supplies, has become a major function of federal and state agricultural departments, and despite the best efforts of the inspectors a certain small percentage of weed seeds still get by. Others probably came in ship-borne supplies of hay and straw used as feed and bedding for animals in transit. Still other weeds undoubtedly got their start on our shores when sailing ships dumped out the dirt and stones they carried in their holds as ballast.

A few weeds are plants that were brought in purposely and have since run wild—after the manner of the English sparrow and the starling. Such was the history of hemp, for example, brought in as foundation for a cordage industry that languished and died with the passing of sailing ships. Such also was the story of the teasle, whose prickly pods were once a necessary adjunct of the cloth-fuling industry. Some were originally ornamental plants, like the Australian saltbush on the West Coast and the Japanese honeysuckle along the Eastern seaboard.

But however they got here, and however little we want them now, they are here, and here they apparently are going to stay.

Science News Letter, June 9, 1945

● Just Off the Press ●

COASTS, WAVES AND WEATHER FOR NAVIGATORS—John Q. Stewart—*Ginn*, 348 p., illus., \$3.75.

HOW TO SOLVE IT, A New Aspect of Mathematical Method—G. Polya—*Princeton Univ. Press*, illus., 204 p., \$2.50.

HISTORY OF PHOTOGRAPHY—Josef Maria Eder—*Columbia Univ. Press*, 860 p., illus., \$10.

INFRARED AND RAMAN SPECTRA OF POLYATOMIC MOLECULES—Gerhard Herzberg—*Van Nostrand*, 632 p., illus., \$9.50.

INTRODUCTION TO MEDICAL SCIENCE—Lulli Lindh Muller and Dorothy E. Dawes—*Sanders*, illus., 454 p., \$3.

JOB PLACEMENT REFERENCE, With Introduction to the Job Placement Technique—Keith Van Allyn—*National Institute of Vocational Research*, 356 p., \$10.

MAN AND HIS FOOD—Labor's Committee on Food and Nutrition, cooperating with War

Food Administration, paper, 8 p., Free

A MANUAL OF TROPICAL MEDICINE, Prepared Under the Auspices of the Division of Medical Sciences of the National Research Council—Thomas T. Mackie and others—*Saunders*, illus., 727 p., \$6.

MEN AT WORK, Some Democratic Methods for the Power Age—Stuart Chase—*Harcourt*, 146 p., \$2.

PRACTICAL PATENT PROCEDURE—Lucy Brett Andrews—*Lucy Brett Andrews*, paper, 32 p., \$1.

YOUR HAIR AND ITS CARE—Oscar L. Levin and Howard T. Behrman—*Emerson*, 184 p., \$2.

YOUR VOICE, Applied Science of Vocal Art

—Douglas Stanley, *Pitman*, 306 p., illus., \$4.50.

VEGETABLE DYES, from North American Plants, Douglas Leechman—*Webb*, 55 p., \$1.25.

Science News Letter, June 9, 1945

America leads the world in the production of optical instruments both in quantity and quality; prior to World War I many optical instruments for America were obtained from Germany, the war gave a great boost to the home industry

ANNOUNCEMENT

WE are proud to announce that the Spencer Lens Company will operate under the name of its parent company after June 30, 1945

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• New Machines and Gadgets •

☼ **FRUIT BAGGER** and weigher is an incline down which the fruit rolls into a bag suspended on one end of a balance beam with any desired weight on the other end. When the bag and contents reach the proper weight, the balance is upset and a gate automatically stops the rolling fruit.

Science News Letter, June 9, 1945

☼ **SHOE PROTECTOR**, to shield a worker's boot when handling oil, is a simple cover for the upper part of the shoe, made of an oil repellent material. Hinged narrow strips at the top are tucked inside the shoe to hold the cover in place.

Science News Letter, June 9, 1945

☼ **CONSTRUCTION LEVEL**, for use where pipes or other parts must be laid at a slight angle with the horizontal, is like the ordinary carpenter's level but has an insert in the base, hinged at one end, that can be opened out to any desired small angle by turning a screw.

Science News Letter, June 9, 1945

☼ **WEED PULLER** and cultivator is a hand garden tool with an S-shaped narrow blade at its end. The blade ends in two prongs that can be used to grasp the weed under the surface and pry it out. When turned over, the prongs may be used to scratch the soil.

Science News Letter, June 9, 1945



☼ **LITTLE GIANT** television tubes, for large-screen home television, are five inches in diameter, less than half the 12-inch prewar tubes on the face of which the picture was read directly. The new tube, shown above, gives a brighter picture and is cheaper to make.

Science News Letter, June 9, 1945

☼ **SALT-AND-PEPPER** shaker, to deliver a measured amount of either or a mixture of both, has two lateral containers and a tube leading from a cup-shaped top to a perforated base. When

inverted, valves control the flow of the condiments to the transparent top, from which they pass through the tube when the shaker is placed upright.

Science News Letter, June 9, 1945

☼ **BABY CARRIAGE**, convertible into a swing, has two arms on each side projecting upward from the axles and hinged at the top. From the same joint other arms extend to the chassis. To convert, front and rear wheels are spread apart, releasing the chassis which is then free to swing.

Science News Letter, June 9, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 262.

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Question Box

CHEMISTRY

What fuel substitute gives more power than gasoline? p. 361.

ENGINEERING

What device shows the bombardier where and when to drop his bombs? p. 361.

GENERAL SCIENCE

How is fatigue helped by a new chemical? p. 354.

How will the 220th anniversary of the Academy of Sciences of the U.S.S.R. be celebrated? p. 358.

GEOPHYSICS

How is Paricutin serving as a laboratory? p. 355.

MEDICINE

How successful has the Army been in curing men with jaundice? p. 357.

ORNITHOLOGY

Do hummingbirds get their food by sucking and larks spur birds? p. 357.

Where did the new blue-plumaged birds at the zoo in Washington come from? p. 360.

PHYSICS

How are fiberglass mats used in underground pipes? p. 360.

How do the Japanese gas masks generate their own oxygen? p. 356.

PHYSIOLOGY

How effective are hormones in preserving youth? p. 356.

PUBLIC HEALTH

What diseases, other than rat fever, may be transmitted by physical contact between rats and human beings? p. 354.

What is the death rate from TB expected to be by 1960? p. 359.

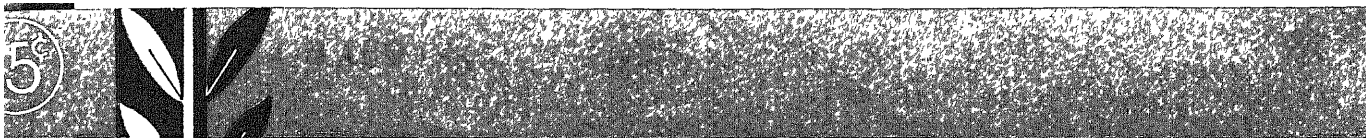
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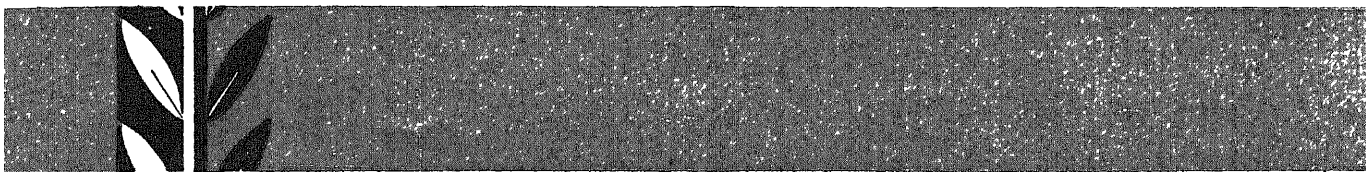
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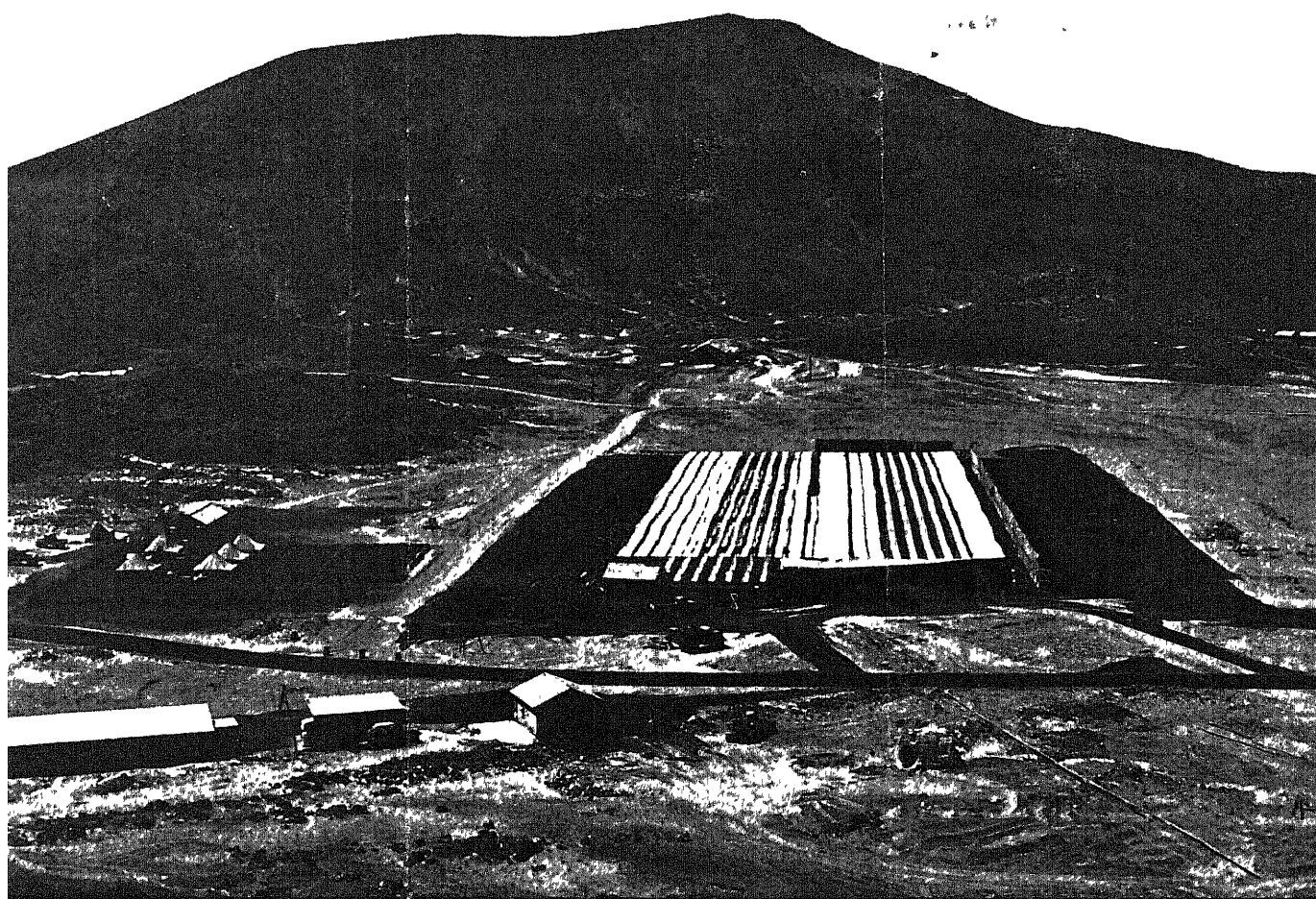
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THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 16, 1945

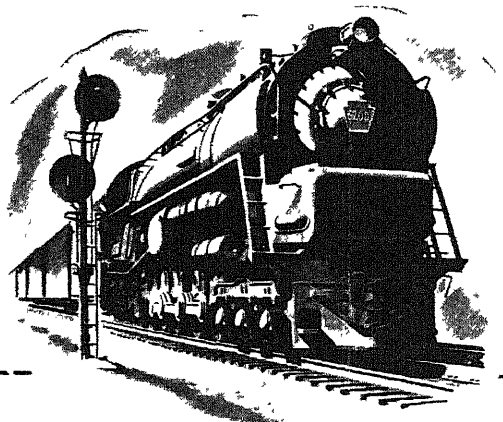
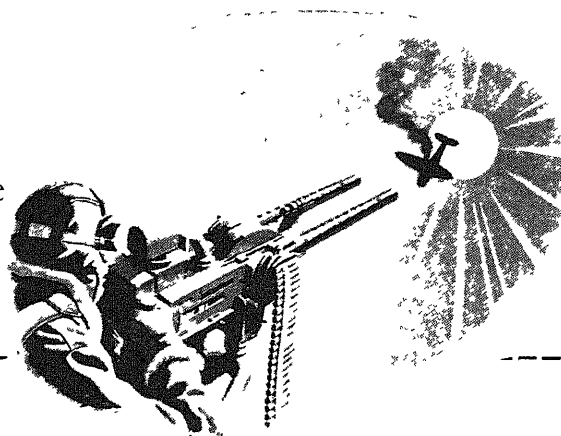


Garden on a Rock
See Page 378

A SCIENCE SERVICE PUBLICATION

In a bomber a GUNNER uses a new gun-sight lamp that permits him to aim *directly into the sun* — blasting enemy planes that otherwise would be invulnerable because of the blinding glare.

... the name on the GUNSIGHT LAMP is Westinghouse.

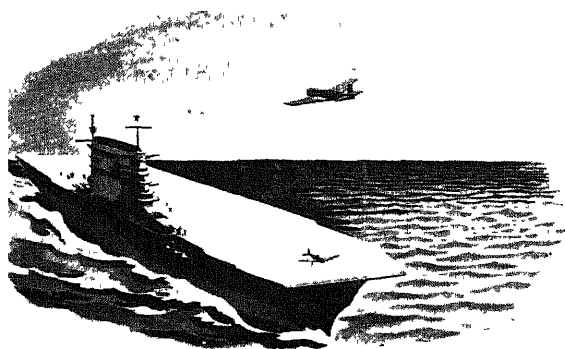
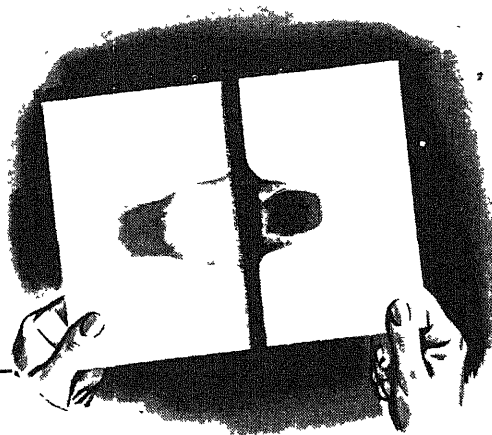


On a railroad an ENGINEER gets smoother operation — and 25% more power — from his steam locomotive because of a revolutionary new steam turbine drive.

... the name on the TURBINE DRIVE is Westinghouse.

In an Army arsenal a BALLISTICS EXPERT photographs projectiles, smashing through armor plate, with an x-ray tube that takes a picture in *1/1,000,000th of a second*.

... the name on the X-RAY TUBE is Westinghouse.



On a carrier a PLANE DIRECTOR uses a new kind of elevator to hoist planes on deck faster — keeping the deck cleared and getting fighters into the air quicker.

... the name on the ELEVATOR is Westinghouse.

Westinghouse
PLANTS IN 25 CITIES OFFICES EVERYWHERE

See in: JOHN CHARLES THOMAS—Sun, 2:30 pm, EWT, NBC

TODAY — Westinghouse skill in research and engineering is constantly at work, developing new and better war materials for final Victory.

TOMORROW — This same research and engineering skill will mean more dependable, more efficient industrial equipment and appliances for the home.

PALEONTOLOGY

Fossil Deposit Found

Ice Age elephant bones, the tooth of a prehistoric horse and insect, tree, shrub and flower remains have been discovered near San Francisco Bay.

➤ BONES of an Ice Age elephant, the tooth of a prehistoric horse, insect remains and a wide variety of tree, shrub and wildflower fossils, found near San Francisco Bay, will help scientists picture prehistoric life in that region.

The fossil deposit was discovered when grading machinery, leveling off a hill that protruded into the edge of a former salt marsh, cut through the stump of a tree—and an elephant's tusk. The area was immediately investigated and the rich assortment of specimens is being studied at San Mateo Junior College, Frank M. Stanger states in *Science* (June 1).

Ten elephant tusks, ranging from four to ten feet in length, were found, as well as bones and teeth, but none of the skeletons were complete.

Tusks that appeared to be sound shattered into small bits at the first attempt to move them, and the bones were usually more fragile than the rock in which they were embedded. Portions of the bones were partially mineralized, while other parts, sometimes of the same bone, had completely disappeared. It was only with great care and the use of plaster casts, Mr. Stanger reports, that any of the tusks or bones were preserved.

Twenty-one more or less complete teeth were discovered, five of which were still in place in the jawbones. The jawbones of two animals are nearly complete, and one other pair was complete, but grotesquely distorted and badly decayed.

The tooth of the prehistoric horse was found in gravel at the edge of a stream bed. It was within a few feet of some of the elephant bones, but not in the same sedimentary deposit.

The green scarab-like iridescence of a beetle's wing was the first evidence of prehistoric insects to be discovered. Beetles, ants and grasshoppers have been identified by F. D. Klyver, paleobotanist at San Mateo Junior College. Numerous specimens of what appear to be insect and spider eggs were also found, either close beside the elephant bones or in the surrounding region.

Douglas fir, Monterey pine, Monterey cypress and alder head the list of identified trees. Snowberry and poison oak are

among the shrub species, and a wild blackberry vine was found, as well as several common Western wild flowers, such as red maids and miner's lettuce. Ranging from small seeds and fine particles of wood to stumps and sizable logs, 68 different varieties of plants have been identified thus far.

Geologists who have studied the fossils generally agree that they belong to the middle or late Pleistocene time. The deposit was discovered only 20 feet above sea level in the unincorporated village of Millbrae, south of San Francisco, on the peninsula that separates the bay from the ocean.

While the alluvial fan was being formed by the streams, Prof. Eliot Blackwelder of Stanford University reasons, much of its surface was probably covered with vegetation on which elephants might feed. During rainy seasons this bed of sand-clay was possibly soft enough to cause animals as heavy as elephants to sink in it and not be able to escape.

After they had been entrapped and

died, their carcasses would have been eaten by carnivores and their bones exposed, scattered and trampled, probably for some time, before being covered by the expanding alluvial deposits.

Once covered, the fineness of the mud-flow around them, together with the never-failing supply of ground water at this low level, would have tended to keep them from decaying completely. Slumps or crawling of the soil, or possibly earthquakes, may have subsequently distorted the bones.

Animals of the Ice Age, such as the ground sloth, mastodon and bison, have already been identified near San Francisco by scattered skeletal remains, but mostly through the discovery of isolated fragments of one animal.

Science News Letter, June 16, 1945

AERONAUTICS

Controllable-Wing Plane Makes Handling Easier

➤ SMALL airplanes may be easier to fly as the result of the development of a new controllable-wing plane now undergoing exhaustive tests at Stout Research Division in Dearborn, Mich. This experimental plane is built so that the position of the wings in relation to the fuselage may be changed at will by the pilot.

Advantage of the controllable wing



CONTROLLABLE WINGS—Greater safety and easier handling of personal aircraft may result from this new development. The controllable wing eliminates the necessity of ailerons, elevators and rudders.

appears to be that it will result in greater safety and easier handling of personal aircraft. The controllable wing eliminates the necessity for ailerons, elevators and rudders.

Several years may be required to develop the wing before it can replace the conventional type, reports I. M. Laddon, vice president in charge of engineering

of Consolidated Vultee Aircraft Corporation, parent company of the Stout laboratories.

The controllable-wing plane was developed by George Spratt, who piled up 100 hours of secret flying with his new plane before friends knew he could fly. He cannot fly a conventional-type airplane.

Science News Letter, June 16, 1945

development of the apparatus for evaluating surface roughness, based upon the degree of variation of the geometric characteristics in a nearly transparent replica. In this apparatus a restricted beam of light passes through an oscillating test replica and to a photoelectric cell. The intensity of the light transmitted through the oscillating replica varies because of the unevenness of the surface of the pattern. Voltage readings of the current from the photoelectric cell may be calibrated in terms of the "peak-to-valley" values of the surface.

Science News Letter, June 16, 1945

DENTISTRY

Hard on Teeth

Drinking large quantities of popular cola drink destroys the enamel, studies with rats show. The effect on humans has not yet been determined.

► DRINKING large quantities of a popular cola beverage is hard on the teeth of rats, causing severe destruction of the enamel, Lieut. Comdr. J. S. Restarski, Lieut. R. A. Gortner, Jr., and Lieut. Comdr. C. M. McCay found in studies at the Naval Medical Research Institute in Bethesda, Md. (*Journal, American Dental Association, June.*)

Since men are not mice or rats, the Navy officers are not yet issuing any warning against human consumption of cola drinks. Differences in composition of the saliva, manner of drinking and amounts of beverage consumed must be studied before the results of the rat studies can be applied to humans.

The cola beverage tested is not the only soft drink that can be hard on tooth enamel. Probably any other acid-containing soft drink would cause the same destruction, especially when sweetened. For reasons of economy, the Navy officers made part of their studies with a drink containing the same amounts of sugar and phosphoric acid as the cola beverage contains. The effect on the rat's tooth enamel was the same.

Ginger ale, grapefruit juice and cranberry juice as well as the cola drink had been found, by another scientist, to have an enamel-destroying effect.

Although the acid alone caused some enamel destruction, sugar added to the acid drink aggravated the effect.

In one part of the study the scientists added sodium fluoride to the acid beverage. Sodium fluoride in very minute amounts in drinking water seems to protect teeth from decay when taken during the years of tooth formation. It decreased but did not entirely prevent the destruction of the enamel caused by the acid or cola beverage.

The only clue so far reported to the

effect of these acid-containing drinks on human teeth came from a study with teeth that had had to be pulled from various patients. When these were immersed in a cola beverage for two days, the enamel surface had lost much of the calcium that gives it its hardness.

Science News Letter, June 16, 1945

CHEMISTRY-ENGINEERING

Plastic Replicas Used To Test Smoothness

► THE SMOOTHNESS, or degree of finish, of metal parts can now be rapidly and satisfactorily determined by the use of nearly transparent plastic replicas, following methods developed by the National Bureau of Standards, and acceptable modes of specifying and designating surface finish will probably result. Metal smoothness specifications have been lacking in the past because no easy method of evaluating them had been worked out.

The new method, described by Harry K. Herschman of the Bureau staff in Mechanical Engineering, consists of applying a suitable solvent to the metal surface, then pressing on a strip of clear plastic film. The solvent softens the side of the film adjacent to the surface being examined and permits it to flow and conform under the pressure to the minute surface irregularities. The film dries in about a minute and can then be stripped off readily, giving a perfect facsimile of the surface.

After a replica is made, its degree of transparency depends upon its roughness; increased roughness results in decreased transparency. Also, the rougher the metal surface, the more pronounced are the variations in the regularity of the reproduced pattern. This fact led to the

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BIOPHYSICS

Cast of Virus Studied

Evaporated gold is deposited on particles of tobacco mosaic disease virus in film only eight Angstroms thick for study under electron microscope.

➤ GOLD films of ultramicroscopic thinness, "cast" over solidified protein particles that are the essence of a virus disease of plants, are helping scientists using the electron microscope to get a better idea of the size and shape of these particles, forever beyond the direct reach of the human eye even when looking through the most powerful of lens combinations.

The new method was worked out in laboratories at the University of Michigan by two physicists, Dr. Robley C. Williams and Dr. Ralph W. G. Wyckoff, who describe it in some detail in *Science*, (June 8).

Objects less than one light wavelength in diameter cannot be made visible in the ordinary-type microscope because they are unable to stop or turn aside light waves. But they can still be photographed when streams of magnetically focussed electrons are substituted for beams of light.

However, the streams of electrons are very apt to destroy the organic particles, or at least radically change them, before suitable photographs can be made. It is

therefore often advantageous to study, not the objects themselves but "casts" formed by depositing some more durable material over them, very much as you can examine last December's snowflakes in June if you caught them on drops of plastic as they fell and kept the molds thus formed.

To get their ultramicroscopic "casts" of tobacco mosaic disease virus particles, Drs. Williams and Wyckoff place a drop of a watery suspension known to contain the virus on a chemically clean glass slide. After the water has evaporated, nothing can be seen on the slide; nevertheless the invisibly tiny bits of solidified virus protein are still there.

They next place their slide in a vacuum chamber, in which a small bit of gold is electrically heated until it goes past its melting-point and becomes a vapor. Some of this evaporated gold falls on the glass and solidifies into a very thin film, just as a sheet of ice would form if water vapor were introduced and the chamber temperature held below freezing-point. Where the gold falls on the virus protein particles, minute hollows are formed,

with every detail of the texture faithfully reproduced.

The gold film is on Angstrom units thick. As is the light-measurer's "unit" it can be realized from light at the limit of high has a wavelength of about 4000 Angstroms. A gold film only 8 Angstroms thick, therefore, cannot be seen directly, and so cannot be directly photographed.

To get around this difficulty, physicists coat the slide with a thin film of gold. This collodion film then is placed on the stage of the electron microscope. By such roundabout means, scientists are finally able to get a picture of invisible virus particles, fitting as a sculptor's life-size model where the searching electron microscope can photograph.

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ASTRONOMY

Fire Lookouts to Make Eclipse Ok

➤ FIRE LOOKOUTS on the Forest Service will help astronomers observing the July 9 eclipse by thinking fast and acting fast. If a fire is discovered, the ideal persons to carry out a series of observations.

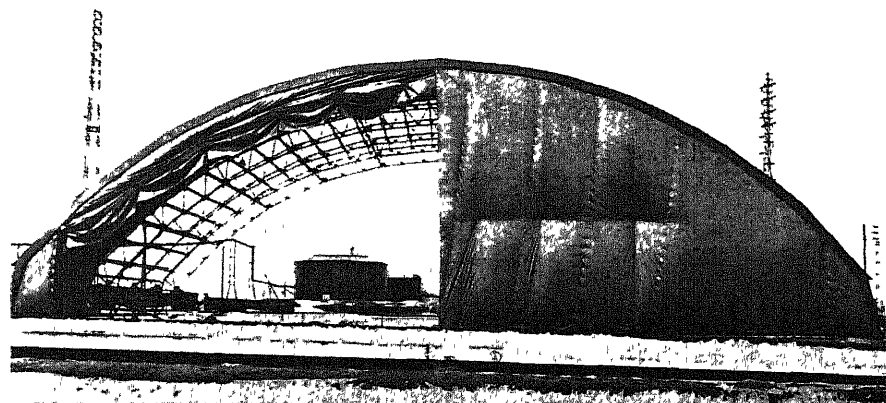
About 60 foresters in Idaho, some of the peaks 10,000 feet above sea level, will watch the shadow of the eclipse. The shadow will sweep down the mountain in about 6:14 a.m. War Time.

A questionnaire sent by Dr. Stewart of Princeton University suggests that their observations relating to the eclipse will be helpful. Its motion is reported in detail; the darkness on the ground estimated; the stars identified during totality, the faintest stars.

The total eclipse is over 100 seconds that no single observer will have time to make more than one observation.

Although Dr. Stewart wants everyone spare a few seconds at the beautiful corona, his observations of the corona are not likely to be of much use, whereas adequate observation of the shadow are very desirable.

Science News Letter



GLASS CLOTH HANGAR—Glass cloth, woven of glass fiber yarns and coated with either synthetic rubber or resin, is being used for curtains, side walls and ends in newly developed airplane hangars. Use of coated glass fabric for sections of hangars saves a great amount of shipping weight and speeds assembly of the hangars.

METEOROLOGY

Meteorological Data Lost

Rev. Charles E. Deppermann, released from internment, tells of loss of publications and manuscripts representing years of work in Manila.

► A HITHERTO unreported tragedy of the war, that instead of destroying a man's life merely destroyed practically all of his lifetime of scientific work, was reported before the meeting of the American Geophysical Union in Washington, by one of the world's leading meteorologists, Rev. Charles E. Deppermann, S. J., assistant director of the Manila Observatory. Father Deppermann was recently rescued from the hands of the Japanese, who had held him in the internment camp at Los Banos.

During the first week after Pearl Harbor, and before the Japanese landing on the northern Luzon coast, a new book by Father Deppermann, of importance to navigators of air and sea, was published in Manila. There was just time to distribute a few copies to Navy officers and Pan-American Airways men before the siege of Manila closed in. Most of the copies were successfully hidden, and the invaders never found them, but the whole stock was destroyed by fire in the last days of the city, when MacArthur's men were storming in on the suicidal enemy. Even the copies that were distributed seem to have perished during the fighting on Bataan and Corregidor.

A number of other works on Philippine weather, still in manuscript, also vanished in the flames. Practically all of this research will have to be done over

again, for the data and conclusions based on them will be needed by navigators in postwar times.

Father Deppermann gave from memory and what fragmentary notes he possessed some of the weather characteristics of the Philippines and adjacent parts of southeastern Asia, in particular the most dreaded of their storms, the typhoon.

The main region of typhoon wind energy, he has concluded, is at heights of from two to four kilometers ($1\frac{1}{4}$ to $2\frac{1}{2}$ miles). There is, however, evidence of violent wind in these storms as high as 10 kilometers (over six miles), but few observations at those altitudes have as yet been taken.

One factor in the development of the low barometric pressures noted in typhoons, Father Deppermann pointed out, is the condensation of water vapor into rain. As a gas, the water vapor contributes to the total atmospheric pressure; when it becomes liquid drops and falls, it is of course withdrawn from the picture and the barometric pressure must fall accordingly. Since rain falls torrentially during a hurricane, this factor may become one of considerable importance.

The region around the fortress-island of Truk serves as an especially prolific breeding-ground for typhoons, the speaker indicated.

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the CBS radio program, "Adventures in Science."

Explaining what happens to an airplane when it approaches the speed of sound in a wind tunnel, Mr. Stack declared that when an airplane is flying, air flows over and under the wing, around the fuselage and tail and around the tips of the wings. The flow in general is smooth. Mr. Davis commented that the effect is like a boat moving through water at moderate speeds and creating bow waves and stern waves.

"Air flows differently than usual when speeds approaching and exceeding the speed of sound are attained," Mr. Stack pointed out. "This is so because sound speed, 760 miles an hour at high altitudes, is really the speed at which a pressure disturbance sends out its influence. One can visualize sound speed as the speed at which the pressure disturbance set up by the body telegraphs to the air the news of the body coming. When the speed of the body is low compared to sound speed, the air ahead has ample advance notice that the body is coming and thus has time in which to prepare itself for the arrival of the body. When the speed of the body is great in relation to sound speed, the air has either too little or no advance notice of the impending arrival of the body and hence cannot properly prepare for smooth passage of the body. What are known as shock waves involving abnormal drag increase, then occur.

"The air which strikes the shock wave usually undergoes sharp change in direction and some energy is lost. The sharp change in direction coupled with the lost energy usually results in separation of the flow from the surface of the body. One might visualize this separation of flow as a breaking away of air in chunks."

Today, the top speed achieved in level flight by an airplane is less than 600 miles an hour, Mr. Stack pointed out. However, the gas turbine and jet propulsion may enable us to fly at supersonic speeds. These speeds offer new problems in aeronautical design, he stated.

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AERONAUTICS

Too Much Speed Is Bad

Traveling faster than sound means getting bumped around violently by air turbulence. Will set new problems in airplane design.

► JUST as people do not enjoy driving through brick walls, so they will not enjoy flying in airplanes at the speed of sound, declared John Stack, chief of the compressibility research division, Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics. When we approach the speed of sound in the air, the turbulence of the air buffets the plane violently, he

stated in response to a question.

Flying at the speed of sound is like driving in a car at high speed over rutted cobblestone roads, he commented, and pointed out that aeronautical research workers are in the process of smoothing this road to achieve flight at supersonic speeds where smooth flows may exist. Mr. Stack spoke as the guest of Watson Davis, director of Science Service, on

The *ginkgo*, a relic of a large plant family that had representatives over much of the world in long-past geological days, is, perhaps, the oldest type of tree; it is also known as the maiden-hair tree.

One thousand fifty pounds of *cork* were stripped from the largest cork oak in the country, at Napa, Calif.

AERONAUTICS

Postwar Jet Engines

Jet propulsion of civilian aircraft depends upon designers' ability to produce a plane of lower drag to offset the high fuel consumption.

➤ JET propulsion of commercial aircraft in future is dependent upon aircraft designers and their ability to produce a plane of lower drag to offset the high fuel consumption of the thermal jet engine, declared Dr. M. J. Zucrow of the Aerojet Engineering Corporation at a meeting of the Aviation War Conference of the American Society of Mechanical Engineers in Los Angeles. Dr. Zucrow discussed both thermal jet engines and rocket motors.

"At present, because of high fuel consumption, the application of the thermal jet engine appears to be restricted to short-endurance military craft," he said.

"Until more of the operating data and actual performance characteristics of aircraft equipped with this form of power plant become available, the possibilities of applying thermal jet propulsion to civilian aircraft cannot be expressed with certainty."

The speaker recognized that jet propulsion provides greater flight speeds than the conventional engine-driven propeller systems.

"Perhaps the most attractive feature of the thermal jet engine, apart from its ability to provide propulsion at high speeds, is its simplicity and low weight," he continued. "Furthermore, this power

plant is relatively free from vibration, permits using cheaper fuels than high-octane gasoline, and should require less frequent major overhauls."

Many problems are presented by the high operating temperatures required to obtain even fair fuel economy, he said, and there are still metallurgical problems to be solved. The fact that thermal jet propulsion has become a practical reality is an indication, he added, that great progress has already been made.

The principal application of rockets to aircraft in the United States, he explained is in the field of assisted take-off. Most of the applications of rocket motor units have been to flying boats, although such units have been successfully used with carrier- and land-based planes. Two types of units are employed, some using liquid and some solid propellants. The solid-propellant units have found the greatest favor, according to Dr. Zucrow.

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CHEMISTRY

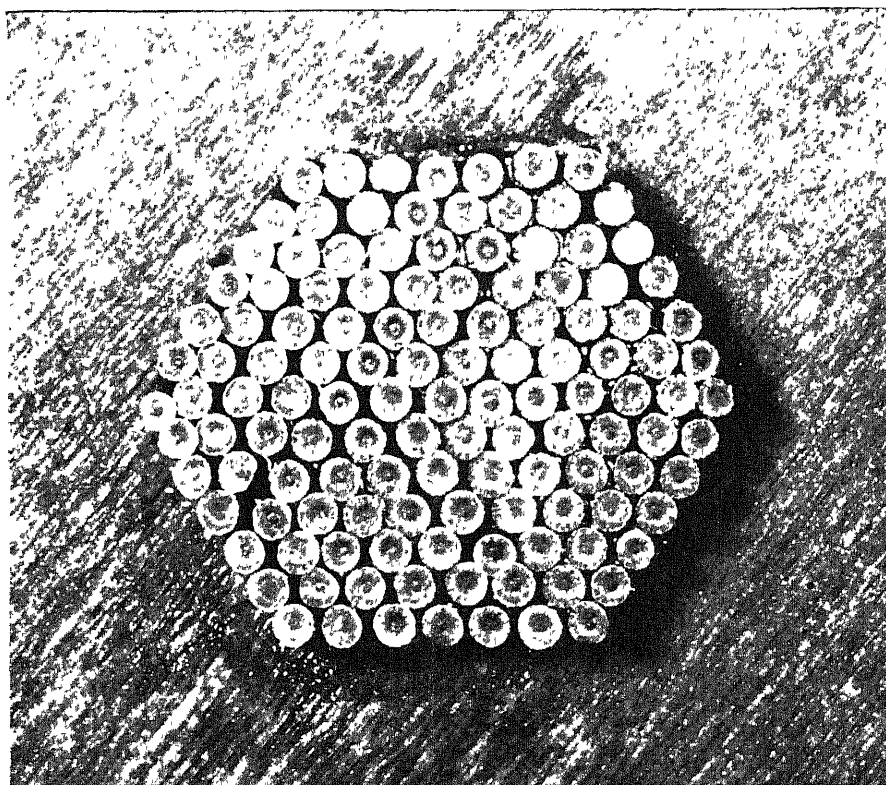
Many Postwar Uses for New Organic Cements

➤ HUNDREDS of postwar uses for a bonding cement, now playing an important role in war equipment, are suggested, from holding metal plates together without rivets or welds, to replacing needles and thread in the garment-making industry. It is a new synthetic cement developed in the laboratories of the Goodyear Tire and Rubber Company, and can be used to bond wood, plastics, rubber, fabrics, and metals together in any combination.

This cement, called Pliobond, forms a bond that is flexible, waterproof and possessed of high tensile strength. It retains these characteristics at temperatures ranging from 70 degrees below zero Fahrenheit to 140 degrees above. It is easily applied and adheres at once to any clean, dry surface.

A bonding agent with similar properties has been developed also by the B. F. Goodrich Company. It is a new rubber cement, called Plastilock, which is a nonthermoplastic, water and aromatic oil-resistant adhesive for bonding metals, wood, plastics and ceramic material to themselves or to each other. In use, better results follow when it is applied with heat and pressure. The purpose of the pressure is to obtain good surface contact. In an attempt to pull apart aluminum and wood held together with this material, the bond proved stronger than the wood itself.

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MATHEMATICAL INSTINCT—It is interesting to note that this cluster of eggs of the Wheel-bug has been arranged by the insect into a definite design with mathematical precision. Each egg is individually glued in place and covered with a water-proof substance. These clusters of eggs are usually found on the bark of trees. The Wheel-bug, like many other insects, seems to have the instinct of arranging its cluster of eggs into a hexagonal design. Photograph by George A. Smith of Quarryville, Pennsylvania.

LOGISTICS

Blood Plasma Fired in Artillery Shells

➤ BLOOD plasma was successfully fired in artillery shells to Allied troops cut off by Nazis in Europe, reports Maj. Gen. Paul R. Hawley, surgeon to the European Theater of Operations. (*Marine Corps Gazette*, May). This adds a new item to the list of many ways in which blood plasma has been delivered to American fighting men. In the past, plasma has gone to the front by plane, ship, on horseback and in jeeps, and it has been dropped from the air in parachutes.

Gen. Hawley reports also that pre-invasion estimates of the amount of plasma that would be required to fill the needs of the Army were far too low. Instead of one transfusion required for every five men wounded, battle experience has shown the need for one transfusion for every two men wounded.

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DENTISTRY

Tooth Decay Experiment Has First Birthday

➤ THE FIRST birthday of a mass experiment to stop tooth decay in two New York cities was celebrated at a luncheon given by the New York Institute of Clinical Oral-Pathologists.

Dentists toasted the future success of the experiment, results of which will not be known for another nine years, in drinks of fluorinated water brought in casks from Newburgh, N. Y. After basic examinations starting a year ago, Newburgh's drinking water supply is having sodium fluoride added to it in the minute amounts believed effective in stopping tooth decay.

Kingston, neighboring city of approximately the same size, will continue to have its water supply free of fluorine and thus serve as a control for the study.

All five- to 12-year-old children in the schools of both cities are having their teeth examined every year. Fluorine-containing water drunk regularly during the years of tooth development, that is, through the age of eight years, protects teeth from decay, it appears from surveys in communities where the natural water supply contains fluorine.

At the end of the 10-year experimental period, comparison of the teeth of the children in both cities should give definite evidence on this point. The effects of fluorinated water on the teeth of persons over 50 years will be deter-

mined by examinations on adults in the two communities.

The study is under the direction of Dr. David B. Ast, dental director of the New York State Department of Health.

"There is every reason to believe," he said, "that artificially fluorinated water will produce in humans the same results in kind and degree that are caused by waters in which fluorine is found naturally."

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ASTRONOMY

Copenhagen Is Again Astronomical News Center

➤ THE END of the European war has had a significant turn in the astronomical world, for word has been received from Denmark of the reestablishment of direct contact between the astronomical clearing house of the Eastern Hemisphere at Copenhagen and the Harvard clearing house for the Western Hemisphere.

Harvard College Observatory received the following wire from Prof. Elis Ström-gren of the Copenhagen University Observatory:

"Please from now on send again astronomical mail and telegrams directly to Copenhagen."

During the European war communication with Copenhagen and the astronomers on the continent was carried on only by way of Sweden, thereby often resulting in serious delays in the transmission of information on suddenly appearing new stars and rapidly moving comets.

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ENTOMOLOGY

Department of Insects Opened at Bronx Zoo

➤ A NEW Department of Insects has been opened at the Bronx Zoo in New York, where the more interesting species of this important but small-sized order of animal life will be on public display. For the present, the "insectarium" will occupy part of the Zoo's reptile house, but as soon as postwar conditions permit, a special building will be put up to house the insect exhibits.

Brayton Eddy, former Administrator of Entomology and Plant Industry for Rhode Island, has been named Curator of Insects at the Zoo, and has also become Acting Curator of Reptiles. The late Dr. Raymond L. Ditmars was in charge of reptiles for more than forty years.

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IN SCIENCE

BOTANY

Russian Botanists Plan To Exchange Specimens

➤ AMERICAN scientific museums and universities will soon have opportunity to get seeds and herbarium specimens of Russian plants, in exchange for American botanical material. Large-scale preparations for this scientific cooperation are being made at the Central Botanical Gardens in Leningrad, the Academy of Sciences of the USSR has cabled to Science Service.

Greenhouses and other buildings of the gardens, which suffered severely during the long siege of Leningrad, are being rebuilt, and more than 700 acres of new land has been added to the working area. About 10,000 trees, shrubs and flowers are already growing in the nurseries.

The Leningrad botanical institution traces its origin to a garden of medicinal plants set out in 1713 under the direction of Czar Peter the Great.

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CHEMISTRY

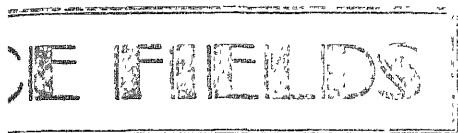
Peanuts Found Useful in Adhesives, Paper Sizings

➤ PEANUTS, long regarded lightly as of interest only to small boys and circus elephants, are steadily rising in the scale of industrial and agricultural respectability. U. S. Department of Agriculture scientists are finding new and more efficient uses for them, in addition to their already big-business role as producers of a high-grade vegetable oil.

The high-protein meal left after oil extraction has long been used as livestock feed; but now industry comes forward to compete with livestock for a share of it. Peanut protein has been found useful in adhesives, paper sizings and fabric coatings, by chemists at the Southern Regional Research Laboratory in New Orleans. The sugary liquor remaining after protein extraction can be used as a culture medium for a food yeast, thereby providing an additional source of protein for livestock feeding.

At the Northern Regional Research Laboratory in Peoria, Ill., chemists have developed a method for using ground-up peanut hulls instead of ground cork as a basis for crown cap liners for bottles.

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VETERINARY MEDICINE

Fern Hay Poisonous to Horses, Studies Indicate

➤ HAY containing the dried leaves of the sensitive fern, a species widely distributed over the eastern half of the United States, is unwholesome for horses, studies at the University of New Hampshire have shown.

Horses are not all equally susceptible to the fern's poison. Old horses fed on hay alone were most frequently affected, while working horses that were fed grain along with the hay were not harmed. Chances of recovery, of course, were best when the trouble was detected in early stages.

Sensitive fern, so called because it is easily killed by frost, is an unattractive, coarse-leaved plant that grows abundantly in damp lowlands, and hence is very apt to be mixed in with hay mowed on wet meadows.

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CHEMISTRY

Willard Gibbs Medal Awarded Dean Whitmore

➤ THE WILLARD Gibbs Medal Award of the Chicago section of the American Chemical Society goes this year to Dr. Frank C. Whitmore, dean of the School of Chemistry and Physics of Pennsylvania State College. Dean Whitmore was selected as the 34th recipient of this prized medal by a jury of 12 prominent American chemists because of his outstanding contributions to organic chemistry, and his vigorous leadership in the advancement of chemistry for national benefit. The formal presentation will be in September.

Much of the work of Dr. Whitmore has been accomplished during the 15 years that he has occupied his present position. Prior to 1929, however, original investigations made by him in organic chemistry at Harvard, Williams, Rice Institute, University of Minnesota and Northwestern University had attracted much attention. He is the recipient of other medals and of several honorary degrees.

This annual award, regarded by many as the outstanding medal award in the

chemical field, was founded in 1911 by William A. Converse, who named it for the late Willard Gibbs, renowned American physical chemist.

It is awarded to anyone who, because of his eminent work in, and original contributions to, pure and applied chemistry, is deemed worthy of special recognition. Among many notable former recipients are Ira Remsen, Mme. Curie, Irving Langmuir, Vladimir Ipatieff and Thomas Midgley

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MILITARY SCIENCE

Fewer Unknown Soldiers In World War II

➤ WORLD WAR II will have fewer Unknown Soldiers than World War I, as a result of identification techniques now in use on every battlefield. Only a little over 2% of the dead soldiers in this war, in our 321 overseas cemeteries, are unknown, thanks to the thoroughness of the Graves Registration Service of the Quartermaster Corps.

This drastic reduction has been brought about through the use of identification bracelets and "dog tags" on all service personnel, and through the development of a small, compact portable fingerprinting kit. Weighing only five pounds, the kit measures 9.5 inches long, 7 inches wide, and 2.5 inches deep.

Normally, the "dog tags" or bracelet establish a man's identity without question. On every report of interment, the raised letters on the dog tags are impressed into the surface of the report form itself, for permanent reference.

However, should the tags or bracelet be missing, the fingerprints are taken and a chart of the upper and lower sets of teeth are made. When these are compared with the master records, the true identity of the serviceman is revealed.

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HOME ECONOMICS

Cold Water Canning Found Unsatisfactory

➤ COLD WATER canning, sometimes recommended for rhubarb, gooseberries and sour fall grapes, has been found unsatisfactory by home canners. The acid in these tart fruits, according to the U. S. Department of Agriculture, may keep them from spoiling when sealed in jars filled with cold water without heating or processing, but the fruits keep little or nothing to make them appetizing.

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ASTRONOMY

Eclipse Visible to Fighters in Pacific

➤ A PARTIAL eclipse of the moon on Monday, June 25, will be visible to our fighters in the Pacific, although we in the United States will not be able to enjoy the spectacle.

The moon will partly enter the shadow of the earth for people in the Pacific, Indian and Antarctic Oceans, Asia, Australia and southeast Africa. Instead of light being cut off from the entire moon, only 86.4% of the moon at most will be eclipsed. The moon will enter the shadow proper, or umbra, at about 1:37 p.m., Greenwich Time, and will leave it at 4:51 p.m.

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AVIATION-MEDICINE

Mechanical Head Used To Test Oxygen Masks

➤ A MECHANICAL head that breathes and can smoke, a practical device for testing oxygen masks and heated coverings for use at the extreme low temperatures encountered by airplane crews at high altitudes, was displayed to a selected group of scientists in New York by the General Electric Company, in whose laboratories at Bridgeport, Conn., it was constructed. It has recently been placed in use by the Army Air Technical Service Command at Wright Field, Ohio, where the idea was developed and specifications prepared.

The mechanical head resembles the human head in size and shape. A rigid skull of wood maintains the contour of the face, while a layer of "flesh" made of synthetic rubber sponge simulates the resiliency of the human tissues so that the mask fits closely. Heating wires are laid on the sponge tissue, and over this is placed a synthetic rubber skin. When electrically heated it simulates the thermal properties of the human face. Breathing is simulated by electrically controlled artificial lungs.

When used in testing, the breathing head, equipped with an oxygen mask, is placed in a chamber with a temperature as low as 60 degrees below zero Fahrenheit, if desired, and is operated by remote control from an instrument board in a comfortable room. It replaces human beings formerly used, who often suffered discomfort and danger from the extreme cold. Also it permits testing under conditions much more severe than is possible with humans.

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HORTICULTURE

Vegetables Without Soil

Lettuce, cucumbers, green peppers, white radishes and tomatoes will constitute the regular crops of the hydroponic garden on rocky Ascension island.

By FRANK THONE

See Front Cover

➤ AFTER the war, Uncle Sam is going to find himself in possession of a whole flock of desert islands. He doesn't especially want them, but after dispossessing the Japs at high cost in American boys' lives he won't feel like throwing them away again.

Some of them will be valuable as naval and air bases, and as cable and radio centers, so at least small garrisons and technical operating forces will have to be maintained on them. Feeding these men is likely to be expensive, for most of these islands are actually desert: they consist either of bone-white coral sand or equally sterile lava and volcanic ash, with little or no soil suitable for gardening. Practically all provisions will have to be shipped in.

One means for relieving the monotony of a shipped-in diet for the forces stationed on these islands is now receiving its first large-scale try-out on the other side of the world. On Ascension island, a barren bit of rock that roosts almost on the equator midway between South America and Africa, the Air Quartermaster of the Army Air Forces has had set up a hydroponic garden, shown in the photograph on the front cover of this SCIENCE NEWS LETTER, that has begun to supply tomatoes, lettuce and other fresh salad vegetables for the garrison and transient flying personnel.

Heroic Undertaking

Attempting to grow green stuff on Ascension would seem at first glance to be almost as heroic an undertaking as gardening on the moon. Indeed, the island looks like a bit of the moon's surface, as depicted by astronomer-artists: its 35 square miles are simply a series of dead volcanic cones and narrow, cinder-choked valleys. A general idea of what the island is like can be gathered from the background of the cover picture.

Except for one green patch on top of the highest peak, that sticks up into the cloud level, the island gets almost no rain. The natural vegetation consists

of scattered clumps of cactus, sparse dried-out grasses, and a white-washing of lichens on the rocks. It is altogether a Dantesque landscape—a lost world almost without any life of its own.

Forbidding as it is, this isolated little world has been the scene of some of the most intense activity of the whole war. Bombers and transport planes whose war-cargoes helped to save North Africa from Rommel stopped here to refuel; fighters en route to India and China still touch down here in great numbers. When the first crop was gathered permanent garrison and transient personnel together numbered about 2,000; the number of course is always fluctuating; there is also a small civilian population that takes care of the highly important cable station which the British have long maintained on Ascension.

Here as everywhere else, water is the key to life. Every drop of water that all the fighting forces here use for all purposes has to be distilled from the undrinkable brine of the ocean. Army Engineers

have set up an oil-fueled distilling plant that is a marvel of efficiency under the circumstances; it produces about 30,000 gallons of good fresh water every 24 hours.

This distilled water is what has made it possible for the military Robinson Crusoes on this desert island to satisfy their natural craving for something green, to supplement what comes out of the shipped-in boxes and cans and bags.

From now on as long as needed, everybody on the island can have lettuce at least twice a week, with cucumbers and green peppers to make the salad more tasty. There will be hot-flavored white radishes once a week. Tomatoes start out on a twice-a-week basis also, but when the vines reach full bearing there should be tomatoes every day.

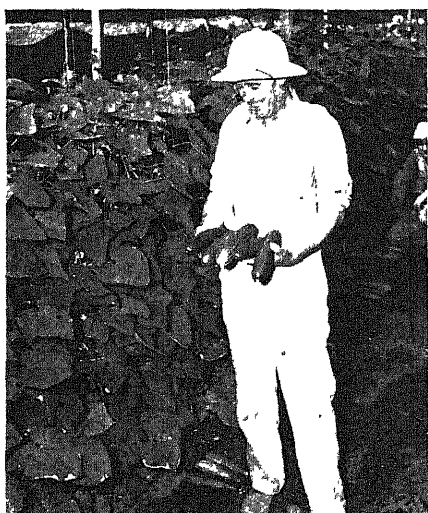
Five Regular Crops

These five vegetables will constitute the regular crops of the hydroponic garden. Under the limitations imposed by space and working force available, it is considered best not to attempt growing vegetables that require cooking.

The hydroponic system used on Ascension is the one in which the plants are rooted in beds of sterile gravel, which



LETTUCE FOR SALADS—Lettuce is harvested leaf by leaf, letting the stalks stand to start producing again. In this way four crops can be harvested from the same plants, before re-setting becomes necessary.



NOT PRIZES—Kendrick Blodgett, who runs the hydroponic garden, looks pleased over some of his cucumbers. These aren't prize specimens—just "run o' the crop."

are irrigated every two days with water containing the essential mineral fertilizer elements in solution. After the trough-like beds have been flooded with 7,000 or 8,000 gallons of water, as much as will drain off is permitted to flow into a sump, where it is held for re-use at the next irrigation. About 70 per cent of the water used is recovered in this way.

Each bed is a long, narrow trough sliced out of the lava soil, three feet wide and 400 feet in over-all length, but divided into four descending steps to make drainage better. The beds are made waterproof with asphaltic concrete, lined with a non-toxic asphalt paint. There are 25 of them altogether, with gravel walkways between for the convenience of the working force, giving a total crop-raising surface of 30,000 square feet.

Protected From Sun

The whole installation, covering a space as big as a large city square, is partially roofed with white cloth supported on wire, like a Connecticut tobacco field; the strips are arranged to give protection from the noon sun to part of the beds, but over some of them, especially the cucumbers, the covering is complete. There are also windbreak-fences around the sides, to check the drying sweep of the southeast trade winds that blow endlessly over the island.

Some interesting problems have been encountered in connection with this soilless garden on a desert island. Cucumbers and green peppers need bees for

pollination, and there were no bees on Ascension. So a hive of them was brought, by plane, from Brazil, 1400-odd miles away.

Tomatoes are normally able to pollinate themselves, but for some reason the pollen they produced here was scanty and not very good. So each flower gets a squirt of a growth-promoting substance, or plant hormone, which induces the formation of seedless fruit. Ascension tomatoes, being partially pollinated, do have seeds, but very few of them.

Lettuce is harvested here leaf by leaf, so that the stalk may be left standing to produce a new crop. Each stalk will yield four pluckings of leaves before it needs to be pulled up and replaced with a new plant.

Civilian in Charge

The whole hydroponic project on Ascension has from the outset been in charge of a civilian employe of the Army, an Indiana horticulturist named Kendrick Blodgett, who had already scored considerable success in raising vegetables under tropical conditions. As his chief aid he has Lieut. John S. Fisher, who in civil life was an entomologist. He recruited a force of ten non-commissioned officers to help him, by having the entire Air Forces screened for young men who had attended agricultural colleges. These are the men who will aid him in carrying the soilless gardening method to other islands. Seven more enlisted men, who had been farm boys before the war, were added to the working force out of ground personnel on the island itself.

One of Mr. Blodgett's eleven disciples had already had experience in hydroponic gardening; he raised flowers by that method in his own greenhouse in Philadelphia. Sgt. William Brientnall is a graduate of Pennsylvania State College. He has been put in charge of the propagation house, where all plants except radishes are started; as his aide he has Sgt. William Buckley, a California Agricultural College graduate.

Already first moves have been made toward the spread of these soilless gardens to other desert islands that are key points in our transoceanic airways network. A small installation has been set up on Christmas island, just north of the equator and almost due south of Honolulu.

Johnson Island Next

Next on the list is Johnson island, another coral patch a long airplane hop to the southwest of the Hawaiian center. Mr. Blodgett says that area commanders

are asking for his gardens faster than he can get them set up, even with the aid of his devoted eleven. It looks as if hydroponics has a promising future in making the desert blossom, if not like the rose, at least like cucumbers and tomatoes.

Science News Letter, June 16, 1945

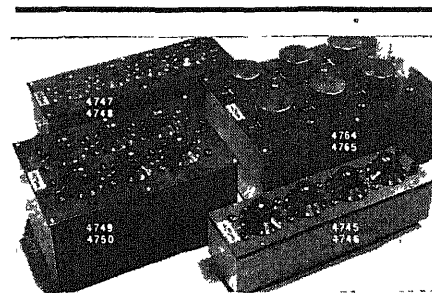
CHEMISTRY

Vitamin Discoverer Rescued From Nazis

➤ ONE of the men who discovered the chemical identity of vitamin C, Prof. Albert Szent-Gyorgyi of Budapest, was rescued from the Nazis and is now safe in Moscow. News of his safe arrival there comes from his colleague, Prof. Hugo Theorell in Stockholm.

The Swedish Legation in Budapest managed to save the Hungarian Nobel Prize Winner by employing him as chauffeur. A package of manuscripts covering his latest research has also been saved and is now being printed in Stockholm with funds from the Nobel Foundation. The manuscripts were smuggled from Budapest last November with Swedish help.

Science News Letter, June 16, 1945



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Do You Know?

The *sandbox*, tropical American tree, grows woody capsules which dry and burst with a loud report like a pistol shot, scattering their seeds.

Pollinating *insects*, such as honeybees and bumblebees, are not injured by sabadilla, a new insecticide for alfalfa, as they are by DDT.

Soil erosion by wind and water removes 20 times as much soil fertility annually as is required by agricultural crops.

The extraordinary *Brazil nut*, growing on trees from 100 to 120 feet high, is really a seed and not a true fruit like walnuts, or chestnuts.

Ocean currents are indirectly responsible for Peru's guano deposits; fish are stunned by the sudden change in temperature where a cold and a warm current meet off the coast, making the region a feeding area for guano-producing birds.

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PHYSICS

Microwaves Flow

Close relatives to wartime radar, they can be reflected from the human body as well as metal surfaces and can pass through tubes and around bends.

➤ MICROWAVES, close relatives to wartime radar, can be reflected from the human body as well as metal surfaces, and can be made to flow through pipes like water, reports Prof. George B. Hoadley, of the Polytechnic Institute of Brooklyn, and chairman of the New York Section of the Institute of Radio Engineers. The microwave band of the spectrum is sandwiched in between the frequencies suitable for radio broadcasting of sound and the heat and light frequencies. Transmitted from an antenna, one to two inches long, they exhibit strange properties.

The radar action of microwaves was demonstrated by Prof. Hoadley before the American Institute, by placing the transmitter and antenna equipment on the focal point of parabolic mirrors on the stage, then beaming the mirrors at a three-by-four-foot sheet of metal held aloft at the back of the auditorium. The transmitted waves directed by the parabolic reflector bounced off the metal surface and were picked up by the receiver, also in a parabolic reflector. He also showed that the waves could be reflected from a human body or even a hand, placed in the path of the beam.

Using a 24-foot tube of ordinary four-inch pipe, with an elbow joint in it, Prof. Hoadley showed that microwaves can pass with undiminished power through the tubes and around bends, like water.

He demonstrated that microwaves polarize, like light, by showing that when the receiving and transmitting antennae are set at right angles to each other, no signal is transmitted, even though they are in physical contact. However, when they are parallel, the radio signal can be transmitted.

"Just as glass makes light waves passing through it get shorter," Prof. Hoadley explained, "so does paraffin shorten the wavelength, although the frequency of the signal remains the same." Setting the transmitting antenna in a pipe four inches in diameter, and four feet long, the signal came through virtually with undiminished strength. Prof. Hoadley

then fitted a one-foot section of tubing only one and a half inches in diameter to the end of the four-inch pipe. No trace of the signal came through the restricted section. The smaller diameter pipe acted like a perfect plug to stop the flow of current. Pushing a small solid rod of paraffin into the small pipe, the signal increased in volume reaching its full strength when the paraffin block completely filled the restricted pipe area.

Science News Letter, June 16, 1945

CHEMISTRY

Plastic Molding Compound From Surplus Sugar

➤ SURPLUS sugar (don't look now!) and waste products from sugar factories may be used to make a new plastic molding compound, it was revealed by Dr. Louis Long, of the Massachusetts Institute of Technology, in a report to the Sugar Research Foundation. The advantages of sucrose as a plastic raw material, he says, are due to its almost unlimited supply as an inexpensive, very pure organic compound.

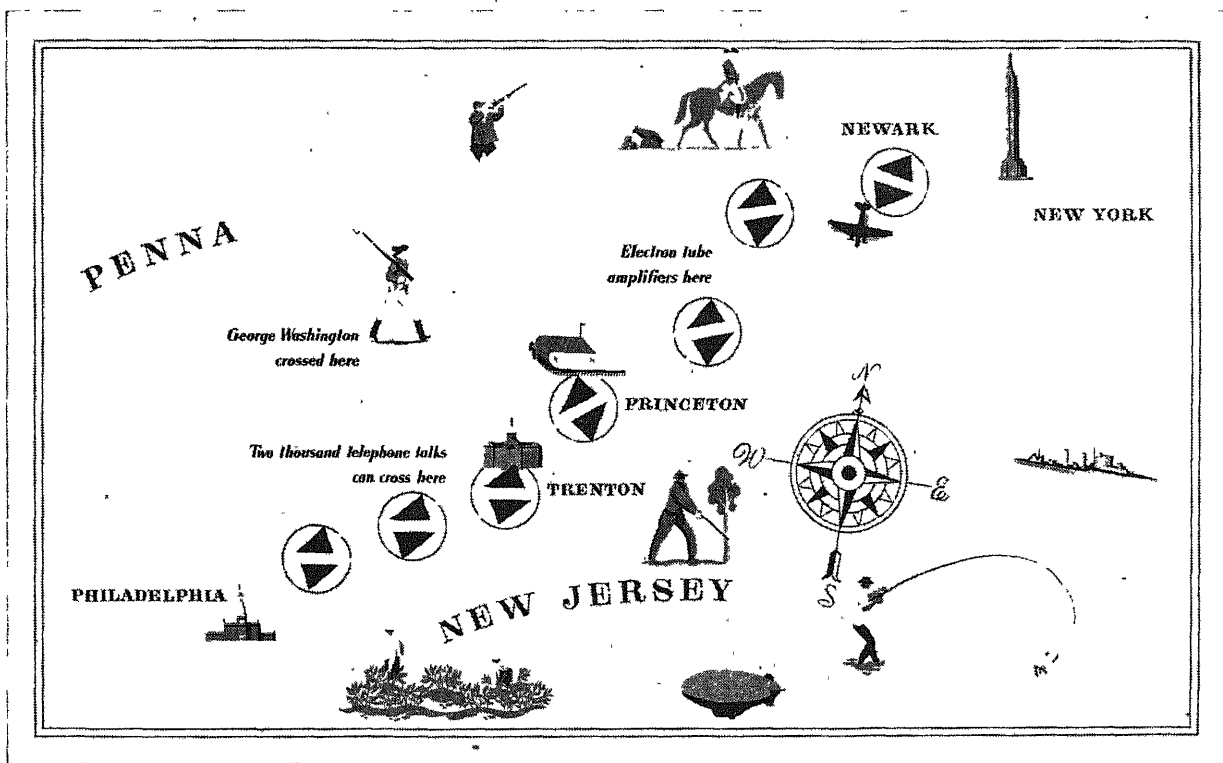
Many attempts have been made during the past 15 years to use sugar or its by-products as a raw material for plastic substances, he states. The results to date have been only theoretical because of the sensitivity of the sugar molecule to heat and chemical treatment, causing it to discolor, and because of the difficulty of controlling the polymerization to produce desirable results. A plastic molding compound, however, is already in commercial production on a small scale from bagasse, a waste product from sugar factories.

"Sucrose, and its hydrolysis products glucose and fructose, are potential raw materials," the report states, "for the formation of both colored and colorless plastics of either the phenolic or the alkyd type, the two resins produced in the largest quantity in this country. Sorbitol and mannitol, reduction products of glucose and fructose, should find application as polyhydric alcohols for alkyd resins. Bagasse molding powders are useful in the thermosetting phenolic plastic field."

Science News Letter, June 16, 1945

90-MILE LABORATORY

for Telephone and Television



BETWEEN telephone offices in New York and Philadelphia once stretched a strange sort of laboratory. Most of the way it was underground, engineers made their measurements sometimes in manholes. It was a lead-sheathed cable containing two "coaxials"—each of them a wire supported in the center of a flexible copper tube.

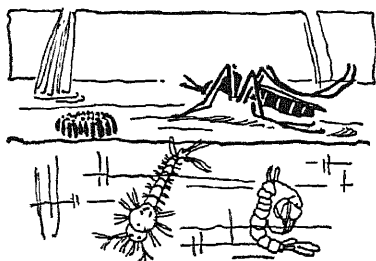
Theory had convinced engineers of Bell Telephone Laboratories that a coaxial could carry many more telephone talks than a full-sized voice frequency telephone cable; that it could carry adequately a television program. Experimental lengths were tested, terminal apparatus was designed and tried out. Finally, a full-sized trial was made with a system designed for 480

conversations. It was successful; in one demonstration people talked over a 3800-mile circuit looped back and forth. Now the cable is carrying some of the wartime flood of telephone calls between these two big cities.

This cable made television history also: through it in 1940 were brought spot news pictures of a political convention in Philadelphia to be broadcast from New York. Bell System contributions to television, which began with transmission from Washington to New York in 1927, have been laid aside for war work. When peace returns, a notable expansion of coaxial circuits is planned for both telephone and television in our Bell System work.



BELL TELEPHONE LABORATORIES Exploring and inventing, devising and perfecting for our Armed Forces at war and for continued improvements and economies in telephone service.



Victory Over Vectors

➤ UNINVITED and unwelcome camp-followers in all wars throughout history have been insects. Fleas and lice made themselves at home in all camps and castles, flies swarmed over the soldiers' food, mosquitoes and other winged blood-suckers pestered them on the march and bred by billions in moats and defensive ditches. Until very recently they were

considered infernal nuisances, but bearable as compared with other campaign discomforts. The men scratched their bites, slapped at the flies, cursed routinely; but that was about all. (A knight in plate armor was well protected against mosquitoes; but it must have been tough when a flea or a cootie bit him and he couldn't get at the itchy spot.)

Late in the nineteenth century, however, after Pasteur had firmly established the germ theory of diseases, it began to be realized that many of the worst germs were carried about by these uninvited intimates of the camps. Typhus and plague, typhoid and dysentery, malaria and yellow fever—the list of indictments and convictions lengthened year by year. The foe might slay his thousands, but insects their tens of thousands.

During the first World War some efforts were made to conquer these insect disease carriers, or vectors as they are called in medico-entomological terminology. Some success was scored against flies, a little against lice, but nothing much against the other plague-bearers. One of the chief handicaps was the lack of a really effective insecticide.

DDT changed all that, so radically that it seems almost miraculous. Body vermin wilted before the medics' powder-guns like Japs before a flame-thrower. With them went the menace of typhus. Sprayed wholesale from planes in certain jungle-island experiments, it exterminated whole mosquito populations—though, regrettably, it also wiped out many harmless insects, such as butterflies.

However, the victory over vectors was not won with one weapon alone. Fumigation cabinets and bags, for example, have played a great part in delousing operations. Just keeping things well cleaned and screened has kept down the flies around established camps. The triple program of draining, oiling and poisoning has made swamps and ponds inhospitable to mosquitoes wherever time and means have been available to put it into practice.

One of our great air bases carved out of a jungle in the southern hemisphere, for example, has a fair-sized lake at one end of it. You would expect to encounter swarms of mosquitoes, with everybody compelled to wear head-nets and gloves. But there isn't a mosquito in sight. In their recreation time, the men play games bareheaded and with their sleeves rolled up, as if there were no such things as insects in the whole wide world.

PHYSICS

General Electric Plans \$8,000,000 Laboratory

➤ WITH PLANS for expanded post-war research and development well under way, the General Electric Company has announced the pending erection of a new building to house its laboratories, at a cost of about \$8,000,000. Construction will begin on a 219-acre estate near Schenectady as soon as WPB approval can be obtained. Dr. C. G. Suits, vice-president and director of research, revealed plans to expand the laboratory staff by several hundred workers.

A feature of the new building, to be built in the shape of a giant T, will be movable walls and partitions that can be set at 18-inch intervals so that rooms can quickly be made large or small as desired. Benches and all furnishings will be standardized.

The site of the new building is on a high elevation, thus permitting experiments with radar, high-frequency jet engines and other devices. The rocky cliff foundation will be useful in conducting experiments with X-rays, possibly permitting increases above 100 million volts.

Science News Letter, June 16, 1945



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Books of the Week

► **WITH PENICILLIN** available for general use and many other antibiotics coming to the fore, physicians and medical students especially will welcome a book dealing primarily with the clinical application of these new substances. Such a book is **PENICILLIN AND OTHER ANTIBIOTIC AGENTS**, by Wallace E. Herrell (*Saunders*, \$5). Although stressing the clinical aspects, the author gives a brief review, with a few humorous anecdotes, of the history of penicillin and other antibiotics, their preparation and chemistry so far as known.

Science News Letter, June 16, 1945

► **MANUFACTURING IN PLASTIC** should be encouraged and simplified by the help of **PLASTICS IN PRACTICE**, by John Sasso and Michael A. Brown, Jr. It brings together a comprehensive list of plastic materials in general use, tells their characteristics and special properties, compares their usefulness for definite purposes both with each other and with older materials, and gives data on manufacturing methods and costs. (*McGraw*, \$4.)

Science News Letter, June 16, 1945

► **THE FUNDAMENTALS** of radio are quite completely covered in **INTRODUCTION TO PRACTICAL RADIO**, by Durward J. Tucker, a manual for beginners which is also a valuable reference for practicing radio engineers and technicians. The principles involved in radio problems are explained with clarity. (*Macmillan*, \$3.)

Science News Letter, June 16, 1945

► **FARMERS** and stock-raisers everywhere are showing increasing interest in what has been popularly nicknamed "test-tube breeding." Very timely, therefore, is the appearance of a very practical, compact book on the subject, **THE ARTIFICIAL INSEMINATION OF FARM ANIMALS**, (*Rutgers Univ. Press*, \$3.50), written by a group of specialists under the general editorship of Enos J. Perry. Since it is thus far the only reasonably complete work on the subject, it is bound to have wide acceptance.

Science News Letter, June 16, 1945

► **PICTURES AND DATA** on all important planes of every air-minded nation are the heart of **AIR NEWS YEARBOOK** edited by Phillip Andrews (*Duell*, \$4.75). Although you have seen some of the plane pictures elsewhere, the book gives you all the latest publishable facts of general interest about these planes. As a whole it is poignant evidence of the importance of air power in a world at war. Comparisons between Jap, Nazi and American aircraft pictures show that the Nipponese designers have drawn heavily upon foreign airplane ideas.

Science News Letter, June 16, 1945

► **READING ABOUT ROCKETS** in the words of one of the organizers of the American Rocket Society is interesting for specialists as well as for those interested generally in such wartime developments as the robot, bazooka, and the jet propelled plane in **THE COMING AGE OF ROCKET POWER** by G. Edward Pendray, (*Harper*, \$3.50). The author traces the evolution of the rocket prin-

ciple from its discovery centuries ago to the present day, then predicts what the future may bring from this little-used form of power. Easier to read than most of the recent books on this subject, this volume takes the reader into the confidence of the scientist and in understandable language unfolds a fascinating story.

Science News Letter, June 16, 1945

Just Off the Press

AGEING AND DEGENERATIVE DISEASES—Robert A. Moore, ed.—*Cattell*, illus., 242 p., \$3. One of a series of volumes devoted to current symposia in the field of biology.

BETTER LAWN—Howard B. Sprague—*Doubleday*, 205 p., illus., \$2.

BUILDING OR BUYING A HOUSE; A Guide to Wise Investment—Kenneth Johnstone and others—*McGraw*, 154 p., illus., \$2.75.

THE CHEMICAL FORMULARY: A Collection of Valuable, Timely, Practical Commercial Formulae and Recipes for Making Thou-

sands of Products in Many Fields of Industry. Vol. 7—H. Bennett—*Chemical Pub.*, 474 p., \$6.

DYNAMIC METEOROLOGY—Jorgen Holmboe and others—*Wiley*, 378 p., illus., \$4.50

INDUSTRIAL PLASTICS—Herbert R. Simonds—*Putman*, 396 p., illus., \$5. Third ed

MODERN BIRD STUDY—Ludlow Griscom—*Harvard Univ. Press*, 189 p., illus., \$2.50

PLANTS AND PLANT SCIENCE IN LATIN AMERICA—Frans Verdoorn, ed.—*Chronica Botanica*, 381 p., illus., \$6

THE SUPERFORTRESS IS BORN The Story of the Boeing B-29—Thomas Collison—*Duell*, 218 p., illus., \$3

SYNTHETIC RUBBER FROM ALCOHOL A Survey Based on the Russian Literature—Anselm Talalay and Michel Magat—*Interscience*, 298 p., illus., \$5

WINGS AND THE WEATHER, A Study Guide in Meteorology for Pilots—A. L. Chapman and others—*Putman*, 188 p., paper, illus., \$1.80.

WOMAN'S MEDICAL PROBLEMS—Maxine Davis—*McGraw*, 220 p., \$2.

Science News Letter, June 16, 1945

To those who wonder why we need still bigger War Loans

IN THE 7th War Loan, you're being asked to lend 7 billion dollars—4 billion in E Bonds alone.

That's the biggest quota for individuals to date.

Maybe you've wondered why, when we've apparently got the Nazis pretty well cleaned up, Uncle Sam asks you to lend more money than ever before.

If you have, here are some of the answers:

This war isn't getting any cheaper

No matter what happens to Germany—or when—the cost of the war won't decrease this year.

We're building up a whole new air force of jet-propelled planes and bigger bombers.

We're now building—even with announced reductions—enough new ships to make a fair-sized navy.

At the time this is written, our casualties are nearing the million mark in dead, missing, and wounded. Wounded

men are arriving in this country at the rate of over 30,000 a month. The cost of caring for these men is mounting daily.

No—this war isn't getting any cheaper. And won't for some time.

This year—2 instead of 3

We need as much War Bond money this year as we did last. But there will be only 2 War Loans this year—instead of the 3 we had in 1944.

Each of us, therefore, must lend as much in two chunks this year as we did last year in three. That's another reason why your quota in the 7th is bigger than before.

The 7th War Loan is a challenge to every American. The goal for individuals is the highest for any war loan to date. The same goes for the E Bond goal. Find your personal quota—and make it!



ALL OUT FOR THE MIGHTY 7th WAR LOAN

• New Machines and Gadgets •

☼ **FINE WIRES** are brazed by a new method that gives a smooth joint and saves materials. A mixture of equal parts of filed silver and borax flux are used. The end of one wire is moistened, heated and stuck in the mixture. The two wires are then brought together and fused over a gas flame.

Science News Letter, June 16, 1945

☼ **RESIN ADHESIVE**, recently developed for bonding intricate wooden parts without the application of high pressure, is particularly valuable in furniture and musical instrument manufacture. This ureaformaldehyde resin is not subject to fine cracking as are many glues, and is moisture resistant.

Science News Letter, June 16, 1945

☼ **FLOATING repair shops** for motorized Army equipment, now in use in the Pacific area, are concrete ships nearly 270 feet in length that are towed by Naval boats to the beaches where needed. They carry supplies of replacement parts and machinery for repair work.

Science News Letter, June 16, 1945

☼ **DEFROSTING** frozen foods by electronic heating, using radio-frequency waves in a new kitchen unit, is a process taking minutes instead of hours as in the customary thawing method. The unit,



shown in the picture, is a "dielectric oven" in which the interior of the frozen food is heated as rapidly as the surface.

Science News Letter, June 16, 1945

☼ **SUCTION clothesbrush**, electrically operated in a manner similar to vacuum cleaner, has its motor, fan and dust bag all within its combined back and handle. It is little larger than the ordinary clothesbrush with wooden back.

Science News Letter, June 16, 1945

☼ **PHOTOGRAPHIC lens** has a built-in heating system to prevent shrinkage of its metal by low temperatures encountered at high altitude. Photographic shots taken with the four-foot lens at heights of eight miles can be enlarged into giant-sized maps that reveal details clearly.

Science News Letter, June 16, 1945

☼ **FOUR-WHEELED plow**, with special attachments, buries rubber-insulated telephone wire in the ground in a single economical operation. Pulled by a truck, it opens a two-foot deep furrow and refills it, burying the wire delivered to the bottom of the trench by mechanism just behind the plow.

Science News Letter, June 16, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 263.

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Question Box

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JUNE 23, 1945



Selling Health
See Page 394

A SCIENCE SERVICE PUBLICATION



RCA Super-FM "soundproofs the air"... eliminates static and other interferences.

RCA Super-FM...storms can be seen but not heard

With RCA Super-FM radio, the most violent thunderstorm becomes a "polite little shower." It can be seen, but never interrupts broadcast reception.

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Super-FM is another "modern miracle" developed by an RCA engineer. You'll owe it to yourself after the war, to hear RCA Super-FM before you buy.

The same kind of "let's do it better" research that perfected Super-FM goes into all RCA radio products. And when you buy an RCA Super-FM radio, or television set, or Victrola—made exclusively by RCA Victor—you will enjoy a unique pride of ownership in knowing that you possess one of the finest instruments of its kind that science has achieved.



George L. Beers, Assistant Director of Engineering for the RCA Victor Division, listens to the RCA Super-FM that he developed. Super-FM provides greater ease in tuning and a higher degree of selectivity as well as freedom from noise and interference.

RADIO CORPORATION of AMERICA

RCA BUILDING, RADIO CITY, NEW YORK 20



MEDICINE

Three Medical Successes

Boy with violin chest, man given up for dead now well, and a blind woman who recovered enough sight to sew, seen at Nutrition Clinic.

► Three cases from a medical reporter's notebook, recorded while visiting the Nutrition Clinic at Hillman Hospital in Birmingham, Ala.:

Mr. L., gaunt and waxy-white except where the rash of pellagra darkened and reddened his skin, sat in his front yard, "expecting the end in two or three days." A nurse driving by saw from the road how wretchedly ill he looked and asked if he would not come to the hospital. Mr. L. replied that it was no use, his end was at hand. His daughter, however, overheard the conversation. Inspired by the hope of help for her father, she took him to the clinic. That was in 1936.

Today he walked spryly into the clinic for a check-up. He feels and looks well and has been working at the fishing camp he runs ever since his discharge from the hospital almost 10 years ago. Vitamins and good diet saved him.

The doctors still see him regularly for check-ups because he cooks for himself and widowers who "bach it" do not always eat as well as they should.

George, a little Negro boy aged three, has a condition so rare doctors today almost never see it. He is far more unusual than one of the upside-down stomach children you have read about. He is the boy with the violin chest.

With his shirt off, his malformed chest above his pot belly really does look like a fiddle, the sides curving in toward the center and out again.

George has rickets in an unusually severe form. But he is getting cod liver oil now and he is going to get well. When he first came to the clinic some months ago, he was literally walking on his uppers. His legs were so bowed that the few steps he could take were made on the tops of his feet. His legs are still bowed but they have already straightened enough so he can walk on the soles of his feet and with fair speed.

"I can see well enough to do my sewing now," Mrs. M. declared triumphantly.

A few months ago she could not see at all. Both her eyes looked as if covered by sheets of frosted glass. The eye doctors decided they would have to be

removed and she had come to the hospital for the operation.

It is by grace of riboflavin that she still has both eyes and good vision in one. After she had entered the hospital for the operation, Dr. Tom Spies, director of the Nutrition Clinic, and his staff heard about her and saw her eyes. They thought her blindness might have come from lack of riboflavin. This is one of the B vitamins and lack of it can lead to severe eye trouble, among other difficulties.

So they asked to be allowed to treat her with huge doses of the vitamin before the eyes were removed. They knew it could not do any harm and they believed it might help.

They failed to save the sight of one

eye. The condition had gone on too long to be reversed. It is still frosted over and sightless. But the other is now clear and keen and Mrs. M. is happy in the ability to do everything for herself, including her own sewing and darning.

Science News Letter, June 23, 1945

MEDICINE

Malaria Cases in Oregon Traced to Soldier

► A 12-YEAR-OLD girl and a grown woman living in a rural section of Oregon have contracted malaria from a soldier returned from the Southwest Pacific. Dr. S. E. Osgood, health officer of Josephine County, Ore., reported. (*Journal, American Medical Association*, June 16.)

These are the only cases of malaria occurring in this rural Oregon area as far back as medical records go, Dr. Osgood states. Nevertheless, Dr. M. E. Corthell, of Grants Pass, Ore., was so alert that the diagnosis of malaria was made in the first case within two hours of the time the little girl came to his office.

She lived in an unscreened house which was only partially finished and lacked



GETS RESULTS!—On the left, a deadly fungus known as late blight has killed the plants. The row on the right has been sprayed with a new and powerful fungicide known as Dithane. These healthy plants promise a good crop, yielding over 100 bushels of potatoes per acre more than plots sprayed with conventional fungicides. The new compound, carrying the forbidding chemical name of diethylene sodium bisdithiocarbamate, is also proving deadly to insects.

panes in several of the windows. The veteran, her great-uncle who had contracted malaria in Australia, lived in a tent about 50 feet from her house for about two weeks before she started having chills and fever. Mosquitoes were plentiful and on examination were found to be the malaria-spreading variety. Existence of this kind of mosquitoes in this rural Oregon area had not previously

even been suspected.

The second case was a neighbor whose house was well within the mosquito range of the returned soldier's tent.

A logging partner of the returned soldier who shared the tent may also have contracted malaria. He has returned to Texas and so far Dr. Osgood has been unable to get in touch with him.

Science News Letter, June 23, 1945

GEOLOGY

Equal Access to Minerals

Wise administration of the world's supply for all peaceful nations lies at the very heart of the problem of world peace, leading geologist declares.

➤ EQUAL access to the world's minerals for all peaceful nations lies at the very heart of the problem of world peace, Dr. Charles K. Leith, University of Wisconsin geologist and leading government consultant, has declared.

Some wise administration must be devised, Dr. Leith said, to withhold the minerals so necessary to war-making from nations that threaten the peace of the world.

"Minerals are irreplaceable assets which are being depleted at an alarming rate," Dr. Leith declared. "No nation has enough of all commercial minerals. The United States is better supplied than any other nation, but during the war it has had to import about 70 varieties of minerals. Interdependence of nations as to minerals is a physical fact, not theory.

"Since the first World War, as nations have waked up to the overwhelming importance of mineral supplies both for their future industry and for their security, there has been a world-wide

scramble to control them, resulting in growing international friction. The degree of success in acquiring mineral supplies measures war-making power in these days of mechanized war. There now looms before us the problem of equal access to the world's minerals."

An adequate answer to world mineral control will require not only international cooperation based on goodwill and pious hopes, but a very high order of scientific fact-finding and analysis, Dr. Leith said.

"The United States and the British Empire have been leaders in the development of the world's minerals," he explained. "Between them they control politically and commercially nearly three-fourths of the world's known mineral reserves. Whatever their attitude may be it is obviously a critical factor in finding an answer."

Dr. Leith spoke during the intermission of a New York Philharmonic Symphony broadcast over CBS sponsored by the U. S. Rubber Company.

Science News Letter, June 23, 1945

CHEMISTRY

Eliminates Gypsy Moths

➤ THE GYPSY moth, which has damaged so many fruit, shade and forest trees within the state, can be completely eliminated from Pennsylvania within a few years, Miles Horst, Pennsylvania Secretary of Agriculture, stated after inspecting areas sprayed with DDT by airplane.

Visiting officials found that in large areas of forest land infested with gypsy moths, airplane spraying with a fine mist of DDT over tree tops kills all the caterpillars.

In areas where airplanes cannot be used to advantage, it is believed that the caterpillar, termed by Secretary Horst the most destructive plant pest of the northeastern states, can be eliminated by spraying the DDT solution on the tree trunks. This would take advantage of the caterpillar's habit of deserting the tree-top feeding ground just before daylight and crawling down the trunk to hide under sticks, stones and leaves. Coming into contact with the spray residue on the trunk, the worm would soon die.

The inspection party, composed of agricultural and forestry officials of New York and Pennsylvania, started at sunrise to watch two airplanes scatter DDT over large woodland areas. Visiting several sections sprayed two and three weeks ago, they found the pests had been wiped out. The party also inspected a 20-acre isolated woodland in Lackawanna County treated experimentally with DDT by plane a year ago and found no moths, egg clusters or caterpillars, indicating that a single spraying had completely destroyed the pest.

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Two planes are spraying with DDT nearly 3,000 acres of the 600 infested square miles in Carbon, Luzerne and Lackawanna Counties. The gypsy moth has been confined to this area by State and Federal control work over the past 12 years at a cost of about \$6,000,000.

New York State has 6,000 square miles

of moth-infested territory, heaviest along the eastern edge. Connecticut, Massachusetts and Vermont have fought the insect for many years. Last year more than 250,000 acres of trees were completely defoliated by the pest in the New England states alone. The use of DDT, however, may change all this.

Science News Letter, June 23, 1945

BACTERIOLOGY

Leads Double Life

The leprosy germ has at times a rod form, and at other times a granule or spore-like form. This makes detection of bacilli difficult.

► THE LEPROSY germ, like that of tuberculosis, may lead a double life, at times going through a phase in which it has rod-like form and at other times having a granule or spore-like form, Dr. Eleanor Alexander-Jackson, of Cornell University Medical College, reports. (*Science*, June 1).

This finding may explain, she believes, why leprosy has such a long incubation period and why it is difficult to find the bacilli in certain kinds of leprous sores.

The discovery was made on material obtained at the Branch Laboratory of the New York State Department of Health from the nasal septum of a Mexican with an early case of leprosy. Dr. Alexander-Jackson used a triple-stain

technique which has been successfully used to detect the tuberculosis mycobacterium. It causes one form of that germ to stain red, and other forms to stain blue, while other organisms, tissue cells, etc., form a light green background.

Unfortunately, when the case was diagnosed as leprosy, the patient suddenly disappeared, making it impossible to obtain further smears for study. But Dr. Alexander-Jackson believes the results she has already obtained from 32 smears of this and other patients from the U. S. Marine Hospital at Carville, La., and from Willard Parker Hospital, to be significant enough to encourage further use of the triple-stain technique.

Science News Letter, June 23, 1945

PSYCHOLOGY

Lack of Shame Normal

The stubborn refusal of individual Germans to admit any guilt in war crimes is due to natural defense of human mind against loss of self-respect.

► REPORTS indicate that the German people do not feel any sense of shame or guilt, either personal or national, over the cruelties inflicted on prisoners and on the people of other nations.

It is not surprising. Even the most vicious criminal may have no feeling of guilt when he is brought to justice; instead he is likely to feel that he has been "framed" and be sorry for himself.

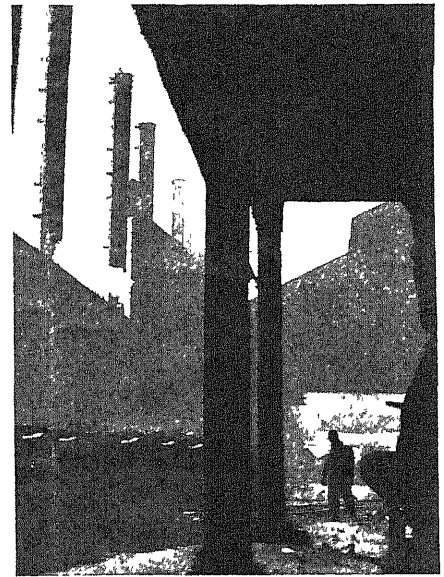
The explanation is that the deepest, strongest need of human nature—stronger almost than the need for life itself—is the need for self-respect. No one can bear to face the thought that he is fundamentally wrong or evil.

When a man is faced with undeniable

evidence of his own guilt, his mind automatically builds up defenses. He refuses to believe that his acts have had such ill effects; he says to himself that he was forced to commit the crimes, that he acted in self-defense; someone else was responsible; or perhaps he says to himself that his victims were not quite human, anyway, and so were not capable of feeling as you or I would about the torture.

Such self-deception is not healthy. But it is better than it would be for a man to admit in his own heart that he is guilty of crimes all the rest of mankind abhors.

It is a good thing that the German



ARC WELDED—These smokestacks, replacing those of conventional design, tower over this industrial scene and signify the importance of the electric arc process in steel mill maintenance. Photograph by the Lincoln Electric Company

people cling to their self-respect even when, in the eyes of the rest of the world, they must share responsibility with their leaders for serious crimes against all humanity. For when a man loses not only the respect of other men but his own as well, there is no longer any hope of his being a useful member of society. Either he kills himself or he abandons any attempt to do what is right and what is expected by one man of another.

What hope there is for building a decent society in what was Germany lies, psychologists believe, in building up on this stubborn remnant of self-respect. Keep the German people from letting go of it and saying to themselves, "I can't help what I do, I am no good." Encourage them, instead, to feel a responsibility for demonstrating to all the world that they are worthy not only of their own self-respect, but the respect of other men as well.

For example, in a declaration of the basic facts regarding human nature that must be considered to attain a lasting peace, more than 2,000 American psychologists agreed that:

"Liberated and enemy peoples must participate in planning their own destiny. Complete outside authority imposed on liberated and enemy peoples without any participation by them will not be

accepted and will lead only to further disruptions of the peace. The common people of all countries must not only feel their political and economic future holds genuine hope for themselves and for their children, but must also feel that they themselves have the responsibility for its achievement."

Science News Letter, June 23, 1945

AERONAUTICS

Airplane Will Furnish Primary Policing Medium

➤ USE of the airplane as a policing medium for world security to prevent acres of gas-filled rockets from being aimed by enemies at distant cities was predicted by T. P. Wright, U. S. Administrator of Civil Aeronautics, in delivering the thirty-third Wilbur Wright Memorial Lecture before the Royal Aeronautical Society. He pointed out that while attempts at inaugurating security organizations heretofore were not successful because of the absence of a suitable policing medium, the airplane promises to fulfill that need.

Mr. Wright declared that we are "on the threshold of the greatest period of aeronautical development that has yet been witnessed." He cited as items which may completely change aviation technique the gas turbine, jet propulsion, electronic devices which will make all-weather flight safe and practicable, and advanced designs of private planes and the helicopter. He estimated that in the postwar years the aviation industry will employ over 600,000 people, 12 times as many people as it did before the war, and will carry 20 million passengers a year on U. S. lines at speeds of 300 miles an hour and at a cost of three cents a mile. At this estimated rate you could fly from New York to Chicago for \$22.26 instead of today's fare \$38.40. Fares from New York to Washington would be \$6.87 and from New York to Los Angeles about \$78.

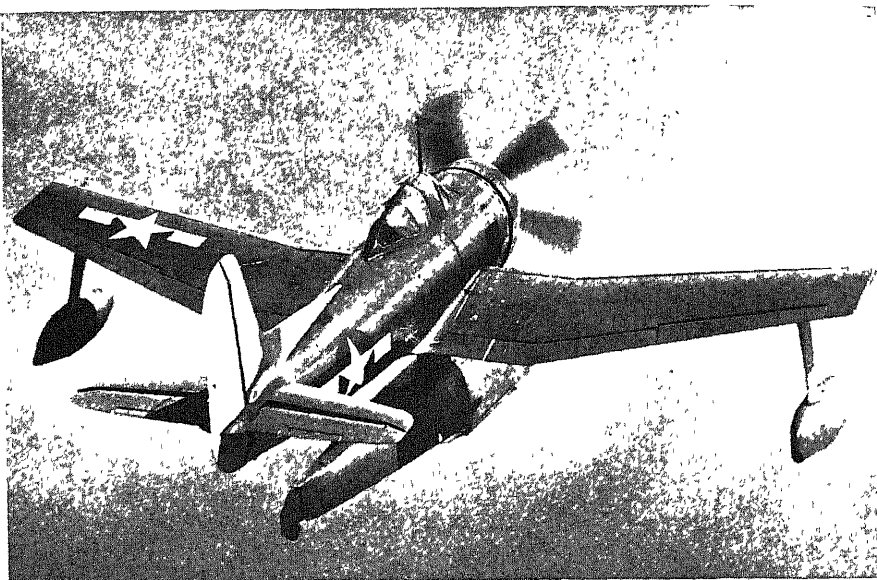
Science News Letter, June 23, 1945

PUBLIC HEALTH

Varnish Makers Protected From Skin Irritation

➤ PERSONS working with cashew nut shell oil, used in the manufacture of varnishes and resins, may now be saved from skin infection by a protective cream. A New Jersey plant discovered that the poison ivy protective cream developed by the U. S. Public Health Service was effective in this case also.

Science News Letter, June 23, 1945



CLIMBING—Skillful design of this new bird, the "Eye of the Fleet", is dramatically shown in this view as it soars from the water. Note pronounced dihedral angle of the wings for greater stability.

AERONAUTICS

Speed Doubled

The Navy's new observation-scout plane, designated the SC "Seahawk," can fly higher and farther than any previous Navy models.

➤ LAUNCHED into active combat from battleship and cruiser catapults recently, for the first time, is the Navy's new observation-scout airplane that is reported to be twice as fast, and can fly higher and farther than any previous Navy models.

Designated the SC, "Seahawk," this new scouting airplane has a single float, and low wing construction, plus nearly three times the horsepower of the OS2U "Kingfisher," the plane used up to now for such work.

The fundamental jobs of the SC are to scout for enemy fleet units, to spot gunfire both in sea actions and in the shelling of enemy shore batteries during landing operations, and to act as an air-sea rescue plane. While the Seahawk is fitted to carry only the pilot, a bunk can be arranged back of the pilot seat into which one man may crawl.

Observation-scout planes are usually considered easy targets for the enemy. With its greatly increased speed and maneuverability, plus added fire power and its ability to carry bombs and depth charges in the float, the SC introduces

into warfare a formidable weapon for use against the enemy in an emergency.

Both airplane and engine are designed and built by the Curtiss-Wright Corporation. The SC uses the newest air-cooled airplane engine in production, the Cyclone 9, which is reported to generate more power per pound weight than any other engine for aircraft in the world. The new engine generates more than 1,200 horsepower, greater than the horsepower of the engine used on the B-17 Flying Fortress, producing more than one horsepower for every pound of weight.

According to P. B. Taylor, vice-president of Wright Aeronautical, the new engine has the power of more than 25 automobiles, power enough to generate current to operate the Empire State Building, and more power than most heavy-duty tugboats.

The Seahawk is equipped with a four-blade hollow-steel propeller that has an unusually wide blade, designed to provide the tremendous thrust necessary to the airplane's fast rate of climb, and cruising efficiency at high altitude. The

propeller looks more like a canoe paddle than a conventional propeller.

Due to the heavy strain imposed on the pedestal attaching the float to the fuselage, a strain which may be equal in force to six times the weight of the entire airplane, engineers designed a strut strong enough to withstand six G's without snapping off.

The SC was designed by 35-year-old Bruce Eaton of the Curtiss-Wright Cor-

poration. He received his M.S. degree in aeronautical engineering at the Massachusetts Institute of Technology in 1932 and for several years has been in charge of wind tunnel research at Buffalo, N. Y. He is credited with the design and development of the modern system of automatic wind tunnel balances, an important aid to testing plane models before "life-size" prototypes are built.

Science News Letter, June 23, 1945

OPTICS

Bronchoscope for Planes

The same instrument that doctors use to find a pin in the baby's lungs now used to inspect almost inaccessible spots around aircraft motors.

➤ OPTICAL instruments are playing an important part in aircraft manufacturing, particularly for photographing or visually inspecting concealed spots that cannot be examined otherwise without inconvenient and expensive removal of some parts of the structure. The use of such instruments, in redesigned form, was explained at the meeting of the Aviation War Conference of the American Society of Mechanical Engineers by Milton Gray of the Erb and Gray Scientific Instrument Co.

A small-bore periscopic device, borrowed from the field of medicine where it is known as the cystoscope or bronchoscope, is used, he said, to inspect almost

inaccessible spots around aircraft motors, hydraulic systems, control housing and other installations having small apertures for insertion of an instrument. The bore inspection telescope, originally designed to inspect riflings and internal finish of big gun barrels, especially redesigned for the purpose, is similarly used.

Science News Letter, June 23, 1945

Standards Control

The necessity and value of applying well-standardized statistical methods to quality control in aircraft manufacture was emphasized by John Howell, of

Northrop Aircraft, Inc., at the same meeting. Such methods, he said, can be used in two principal phases of the problem, process control in the plant, and quality assurance with respect to materials and parts acquired elsewhere. The methods, involving the use of control charts and requiring only simple arithmetic, have been widely used in industry for a number of years, he added.

"Quality does not happen, it must be planned," Mr. Howell declared. "Quality has its beginning in the design of a product. If the design is good, the chances for good quality are much better than if the design is poor. In order for design to be good, the designer must know the capabilities and limitations of equipment at hand and available.

"The knowledge is most readily obtained by the quality control records of previous product," he continued. "The setting of quality standards and establishment of acceptable quality level is an engineering problem with which the statistician can lend valuable assistance."

Science News Letter, June 23, 1945

Heater Ignition System

The physical principles governing the design of an ignition system for aircraft internal combustion heaters were discussed at the meeting by Dr. E. H. Plesset and others of the Douglas Aircraft Company, Inc. Essentials, they stated, are a spark plug with relatively low thermal conductivity, high resistance to chemical attack, high thermal shock resistance, and high dielectric strength. Also important are the relative positions of the gasoline spray, spark plug and gap and inlet air.

Science News Letter, June 23, 1945

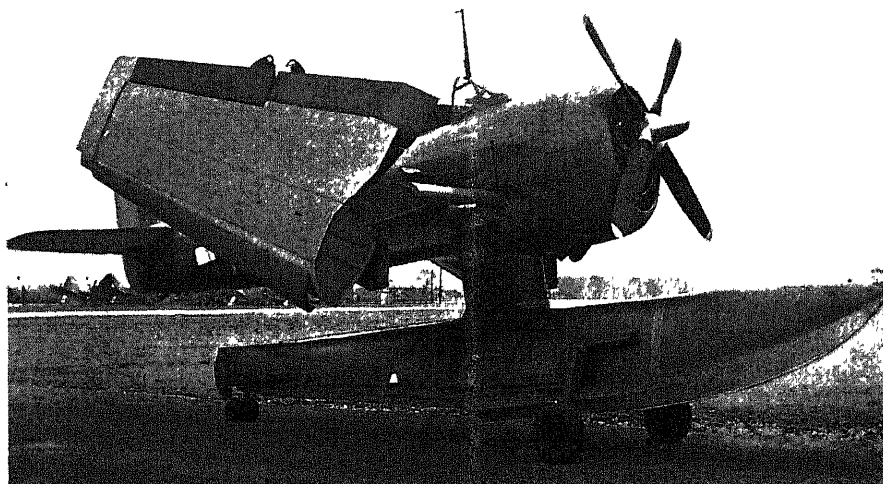
CHEMISTRY

Dr. Frederick T. Wall Gets \$1,000 Chemical Prize

➤ DR. FREDERICK T. Wall, associate professor of physical chemistry at the University of Illinois, has become the outstanding young chemist of the year as the result of the award to him of the \$1,000 American Chemical Society pure chemistry prize. Dr. Wall is only 33.

This prize is awarded annually to encourage fundamental studies by young chemists and it is provided by the Alpha Chi Sigma, national scientific fraternity. Dr. Wall was cited for his independent and original researches on the thermodynamic and statistical mechanics of polymers.

Science News Letter, June 23, 1945



SPACE SAVER—Folding wings are a new feature for a Navy scout-observation seaplane. Shown here on its beaching gear, the new Curtiss Seahawk occupies less space aboard its ship. Official U. S. Navy photographs.

ENTOMOLOGY

Grasshoppers, Chinchbugs Held in Check by Weather

► PERSISTENT wet, chilly weather in the principal crop areas, which has had farmers worried all spring, has been a blessing in dripping disguise in at least one way: grasshoppers and chinchbugs, the two worst insect enemies of growing grain crops, have been held well in check. Both these pests require warm, sunny weather for their full development, and they haven't been getting it. Only in the Southwest, where there has been hot drought, have the 'hoppers been bothersome.

Both grasshoppers and chinchbugs might raise trouble if dry, warm weather were to come now, surveys by entomologists of the U. S. Department of Agriculture indicate. Last year's swarms of grasshoppers matured rather late, but prolonged warm weather in autumn gave them opportunity to lay about the normal number of eggs in the soil. Also, there were unusual numbers of chinchbugs that went into hibernation. Thus far, the eggs remain largely unhatched and the bugs are still inactive, and as long as the weather stays cool the situation will remain "as is."

Science News Letter, June 23, 1945

ASTRONOMY

Gases from Sun's Cloud Absorbed by Prominence

► GASES from one of the sun's flame-like clouds, thousands of miles above a group of sunspots, instead of being sucked into the sunspots, were absorbed by a neighboring prominence of fiery gases, Dr. Edison Pettit of Mount Wilson Observatory reported to the Astronomical Society of the Pacific.

Occasionally one member of a group of prominences, in which gases moved from one to another within the group, has been a rapidly-changing active prominence, but this was the first time on record, Dr. Pettit stated, when a cloud prominence formed out of gases in the corona high above a group of sunspots was known to be absorbed by a neighboring prominence. The large group of prominences was located between a sunspot group and a disturbed region where spots later developed.

The rosy cloud of luminescent hydrogen, helium and calcium probably lasted at least two days. After forming, the fiery cloud as a whole remained in the same position throughout the first day,

only one part being known to move. During the second day, however, as part of the cloud floated toward the other prominence, its velocity more than tripled, increasing from about 11 miles a second to some 38 miles a second.

It is through studies such as this that astronomers hope eventually to discover the secret of the forces acting in and above the sun's surface.

Science News Letter, June 23, 1945

ASTRONOMY

Faint Comet Discovered By du Toit in Africa

► A NEW comet, named du Toit for its discoverer, has been speeding across the heavens during the past two months. The faint comet, discovered by a member of the Harvard Observatory staff at Bloemfontein, South Africa, has been watched by astronomers in South Africa as it traveled from the constellation of Leo, the lion, to Hydra, the water monster.

In April Harvard's South Africa station radioed that the tenth magnitude comet had been discovered on April 9. As the object was not found on plates of the region made at the Harvard Observatory, however, Dr. Harlow Shapley, director of the observatory, withheld announcement and wrote for confirmation.

Harvard has just received a second radio message, presumably in reply to Dr. Shapley's letter, stating that the new comet du Toit has been observed continuously for two months by both the Boyden station at Bloemfontein and the Union Observatory at Johannesburg. Dr. J. Jackson, director of the Royal Observatory of Capetown, has computed the approximate orbit of the comet which is now so faint as to be beyond the limit of the ten-inch photographic telescope.

Science News Letter, June 23, 1945

MILITARY SCIENCE

New Use for Surgical Masks Found by Marines

► THE MARINES have discovered a new battle use for surgical masks, the squares of cotton gauze that doctors and hospital staffs wear when performing operations and when working with patients who have contagious diseases. During the invasion of Iwo Jima, they used 5,000 such masks, supplied by the American Red Cross, as protection for nasal passages against irritating sulfur dust and volcanic ash which clouded the air over the strategic island.

Science News Letter, June 23, 1945

CHEMISTRY-BACTERIOLOGY

Chemical Stops TB Germs In Test-Tube Experiments

► DISCOVERY of a new anti-germ mold chemical that stops human tuberculosis bacilli in test-tube experiments is announced by Dr. Isadore E. Gerber and Milton Gross, of the Hudson County Tuberculosis Hospital in Jersey City. (*Science*, June 15.).

Whether the new substance will prove effective in treating tuberculosis is not stated in the scientific report, which covers only preliminary study of the substance. Penicillin, most famous of the mold anti-germ chemicals, has no effect on tuberculosis germs.

The mold from which the new substance was extracted has not yet been completely identified but is one of a group of Aspergillaceae, of which family *Penicillium* is also a member. The scientists are now striving to isolate and purify the active material in the mold extract and determine the growth conditions necessary for best yield.

Science News Letter, June 23, 1945

ENGINEERING

Glass-Enclosed Penthouse Gives Unobstructed View

► LIKE a greenhouse perched on top of a streamlined railway coach, a new glass-enclosed penthouse will give passengers an unobstructed view of passing scenery—looking up as well as sideways. The new addition to railway coaches is a raised compartment, built into the roof of the car, the top and sides of which are laminated glass.

The new idea in railway coaches, developed by General Motors engineers, goes into service this month on the Burlington Lines, adding the glass-top coach to the list of other vehicles that make use of glass to improve the range of vision of passengers, including glass-bottomed boats and glass-top taxicabs.

The air-conditioned penthouse is reached by a short stairway from the main coach compartment. It contains 24 deep-cushioned seats set high enough so that passengers' heads and shoulders are well above the train's roofline. The addition of the penthouse increases to 58 the seating capacity of the coach.

Science News Letter, June 23, 1945

ENGINEERING

**Communication System
Handles Three Services**

► THE ARMY in its European campaign and the Pacific war has had a very versatile, compact and speedy radio communication system that can carry facsimile picture, telephone conversations and teletype messages all at the same time, Maj. Gen. George L. Van Deusen, chief of the Engineering and Technical Service of the Army's Signal Corps, revealed.

This very high frequency radio relay equipment, or VHF, as it is known for conciseness, has played an important part on every battlefield.

"It was just a matter of hours after the invasion of France before the commanders on the continent were in continuous radio contact with English stations over 100 miles away," Maj. Gen. Van Deusen explained, speaking as guest on the CBS program "Adventures in Science" directed by Watson Davis, director of Science Service. "Telephone messages were immediately followed by the transmission by facsimile of vital air reconnaissance information of military objectives."

Maj. Gen. Van Deusen quoted Gen. Omar Bradley as saying that "our rapid drive across France was dependent on a shoe string, and that shoe string was radio relay."

Science News Letter, June 23, 1945

ENGINEERING

**Plastic Airplane Parts
Win Hyatt Award**

► FOR DESIGNING plastic airplane parts that saved weight and manufacturing time in fighting planes, William Iler Beach, chief plastic engineer of North American Aviation, Inc., Inglewood, Calif., was presented with the fourth annual John Wesley Hyatt award, carrying with it a gold medal and \$1,000.

In the B-25 Mitchell bomber alone, Mr. Beach's process of curing and shaping phenolic laminated plastics saved 141 pounds of weight and 120 man-hours of labor for each airplane as compared with the metal process formerly used.

Postwar uses foreseen for the new plastics forming method include shipping

containers for movie films, decorative tops for kitchen sinks, shoe stiffeners, chemical tanks and athletic equipment.

During the war the new laminates in addition to being used in airplane construction, have been used in ammunition boxes, chutes, hoppers, and nonmagnetic land mine covers.

To honor the founder of the plastics industry, who invented celluloid in 1867, the John Wesley Hyatt award was established in 1941 by the Hercules Powder Company.

Science News Letter, June 23, 1945

CHEMISTRY

**Helium Gas Found Usable
Instead of Air in Tires**

► HELIUM, the exclusively American balloon gas, can be used economically to inflate the huge tires of passenger airliners, it has been found by engineers of the Consolidated Vultee Aircraft Corporation, in San Diego, Calif. Use of this gas instead of air saves weight and permits an increased payload.

Air required to fill the tires would weigh 180 pounds, as compared with 26 pounds for helium. Tests have proved that the puncture-proof tubes will hold the lighter helium gas at the required pressure. An ample supply of helium is available, as the government is now producing more than needed in balloons and dirigibles, and is releasing some for other uses.

Science News Letter, June 23, 1945

CHEMISTRY

**Greenbacks Turn to Gold
In South Pacific Area**

► LETTUCE-GREEN paper money turns to gold in the jungles of the South Pacific, reports Lt. Charles E. O'Malley of the War Department. When banknotes first began coming back from the Pacific, the Treasury Department was startled by the appearance of "gold-backs" which have not been in circulation for over ten years. It seems that the bills are the usual green variety, but the humid heat and gases in the air had turned the green ink to a soft golden color.

Wear and tear on paper money is heaviest in the South Pacific, where the climate causes it to wilt, laminate, and discolor. The life expectancy of a dollar bill on Guadalcanal is about six months, as compared with more than two years of useful life in the United States. Finance officers report that it takes four times as long to count beaten-up bills.

Science News Letter, June 23, 1945

INVENTION

**New Transplanting Tool
Also Dusts Plants**

► A NEW transplanting implement, that also gives the young plants a thorough treatment with insecticidal dust to protect them against pests in their first critical days outdoors, is the invention on which patent 2,376,970 was awarded to W. W. Keown of San Leandro, Calif. It consists essentially of an open-bottomed cylinder with a handle. Pushed over the young plant, it lifts it out of its growing bed with a block of soil around its roots. Pressed into place in the garden, it sets out the plant. A turn of the handle then releases a piston, which sucks in enough outside air to swirl a cloud of insecticidal dust out of a reservoir and thoroughly cover the foliage.

Science News Letter, June 23, 1945

CHEMISTRY

**Purple Pears Harmless
Unless Syrup Is Cloudy**

► THE PINK and purple colors which sometimes develop in home-canned fruit are usually harmless. Apples, pears and quinces which may be pink, red, brown, blue or purple are all right to eat unless the syrup is cloudy, according to Dr. Charles T. Townsend, research associate in the Hooper Foundation on the San Francisco campus of the University of California.

Pigment-forming bacteria and yeasts, which cause spoilage in canned fruit, can easily be recognized by cloudiness of the syrup in addition to the color, and also by odor.

Science News Letter, June 23, 1945

GENERAL SCIENCE

**Carty Gold Medal Given to
Dr. William F. Durand**

► THE CARTY Gold Medal of the National Academy of Sciences was presented to Dr. William F. Durand, veteran research engineer of Stanford University, who is now serving in the war effort as chairman of the division of engineering and industrial research of the National Research Council, and as a member of the National Advisory Committee for Aeronautics.

The Carty Medal, which carries with it a cash honorarium of \$2,500, is awarded every other year to a person who has made noteworthy and distinguished contributions in any field of science.

Science News Letter, June 23, 1945

PUBLIC HEALTH

Fight Against Syphilis

Venereal disease campaign placards, like War Loan posters, hang from lamp posts on Birmingham streets. 300,000 will have blood tested.

By JANE STAFFORD

See Front Cover

► BUY BONDS in the Seventh War Loan is big news in Birmingham, Ala., today, but even bigger news is buying health and freedom from disease through penicillin.

Walk down the business streets and you will read on hundreds of four-by-eight-foot posters, like those on the front cover of this SCIENCE NEWS LETTER, words which a few years ago would have been whispered, if uttered at all. This is the pioneer model city for penicillin's mass attack on syphilis and gonorrhea.

"Penicillin cures gonorrhea (the greatcrippler and sterilizer) in four hours."

"Treatment of syphilis with penicillin completed in nine days," the posters declare in giant letters. The penicillin is free; see your doctor or call the health department clinic, is the rest of the message on posters, billboards and cards in every street car and bus and many store windows.

The campaign against venereal disease now being waged (May 15-June 30) in Birmingham and Jefferson County started with a bill introduced into the Alabama legislature by State Senator Bruce Henderson, a plantation owner of Wilcox County. The bill, now a law, provides that all persons in Alabama between the ages of 14 and 50 shall have their blood examined for syphilis by an approved test and that persons who have syphilis must get treatment either from a physician or free through the State Health Department.

Faced with the task of making hundreds of thousands of blood tests and realizing that syphilis was only part of the venereal disease problem, state and local health authorities turned to the U. S. Public Health Service for aid.

Unusual Opportunity

Federal as well as state and county health authorities saw that this Alabama law provides an unusual opportunity to learn what can be done by a mass attack on venereal disease. Birmingham and surrounding Jefferson County were

chosen for a proving ground in an undertaking that is not only "unique in public health annals," according to the editor of the *Southern Medical Journal*, but which may point the way for other communities to wage more effective war against syphilis and gonorrhea.

The U. S. Public Health Service sent to Birmingham 10 medical officers in addition to the four already stationed there. It sent its Robert P. Anderson to pave the way with a high-pressure educational, publicity and advertising campaign. It set up three centers, or hospitals, for rapid treatment of syphilis. It provides penicillin free for treatment of syphilis and gonorrhea by either private physician or health department clinic.

To make the blood tests on every 14-to-50-year-old in Birmingham and Jefferson County (there are 300,000 of them), teams of skilled blood-testers were sent down from the U. S. Marine Hospital at Staten Island. This is the U. S. Public Health Service institution where Dr. John F. Mahoney less than two years ago gave the first reported penicillin treatments to syphilis patients.

The general staff for this mass attack on venereal disease is made up of Dr. R. R. Wolcott, of the U. S. Public Health Service; Jefferson County's own excellent health officer, Dr. George A. Denison, and Dr. W. H. Y. Smith, active and enthusiastic venereal disease control officer of the Alabama State Health Department. Working under them are hundreds of men and women, physicians, nurses, laboratory technicians, social workers, clerical workers.

Typical of the eager spirit of cooperation is the story Dr. Wolcott told of a physician who called up on a Sunday morning to say:

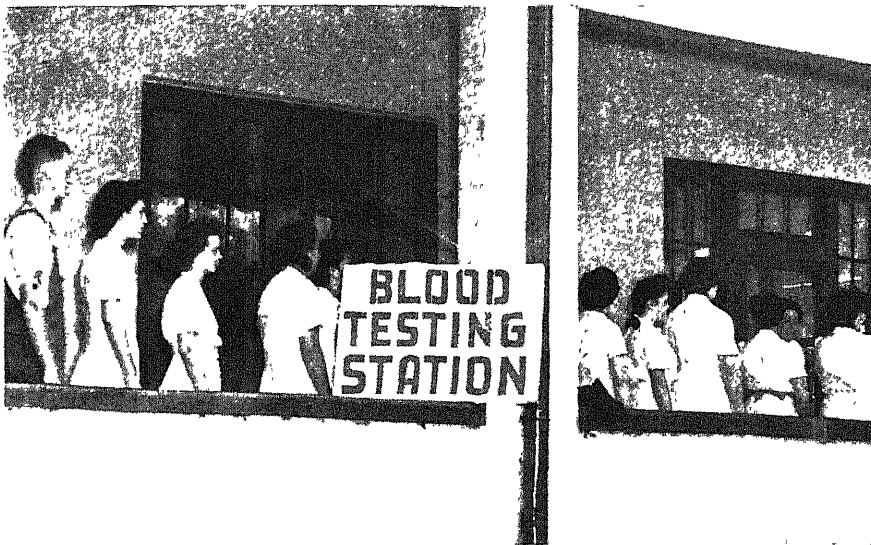
"I sent a load of patients to your treatment center yesterday so I know you will be busy today. This is Sunday and I am not working, so I wondered if I could come over and help you."

Remarkable, also, is the cooperative spirit shown by the residents of the community. Although the law requires the blood tests, no one yet has had to be forced to go for either blood test or treatment. In fact, those who have been told they need treatment are usually sitting on the porch with packed suitcase when the car arrives to take them to the treatment center.

The world's largest blood-testing laboratory has been set up for the campaign.



SYPHILIS TEST—Miss Lea Greenblatt, U. S. Public Health Service nurse, is taking blood to test syphilis.



HEALTH LINE—These citizens of Birmingham, Ala., are waiting their turn at one of the stations set up for blood tests in this venereal disease campaign.

"Willow Run" is the name they have given it because of the volume of work being done and the assembly line procedure.

Physically, the laboratory is not so large. But it is equipped and staffed to make 20,000 blood tests a day. At the start of the campaign, when only 5,000 tests were being done daily, the staff had finished work by 2 p.m. Working at a snail's pace, the skilled blood-testing teams can each do 3,200 tests a day. By the end of the second week of the campaign, 95,600 blood samples had been tested for syphilis.

The story of how the laboratory was created rivals the stories of the swift building of war production plants in the early days of the war. Jefferson County's health department has quarters in the old Hillman Hospital building, where formerly the county's charity patients were cared for. The only space available for the blood testing laboratory was a couple of dingy, dark and dirty basement rooms used to store pauper coffins.

No one believed it could be done, but within eight days these rooms had been transformed into a modern laboratory. Freshly painted white walls gleam under fluorescent lights. Rows of laboratory tables and sinks, centrifuges and drying ovens were installed. Shining glass partitions divide the rooms. A "flow sheet" tacked on the wall near the entrance adds to the "Willow Run" effect and efficiency.

If you want to know just what happens to that teaspoonful or so of blood taken from an arm vein, follow it along this unique assembly line as I did with

Joseph Portnoy, head of the blood-testing team loaned from the U. S. Marine Hospital at Staten Island, N. Y.

The blood samples arrive in small glass tubes, corked and labeled with a code number. They are uncorked and moved to centrifuges which can "spin down" 60 specimens at a time. The spinning down separates the red blood cells from the serum. Next stop on this assembly line is the "pour-off" table where a group of girls pour the clear serum into clean tubes. The code number labels are transferred at the same time.

Next the girls rack the tubes of serum in bright copper baskets and put these in a warm water bath for exactly 30 minutes. Alarm clocks in front of each water bath ring time on the procedure. Then the serums are ready for the test proper.

Sensitive and Quick

The one used here is the Mazzini microscopic flocculation test for syphilis. It was chosen from the many syphilis tests because it is both sensitive and quick. The teams of men who work on this job use glass slides about three-by-five inches in size. Each slide has 48 "cells," which are rings with paraffin walls. A special machine was devised to prepare the thousands of slides used here daily.

Into each ring the blood-tester puts a small, accurately measured amount of serum, placed in order according to the code number for each of the 48 bloods tested on each slide. He adds one single drop of a substance called antigen. The

glass slides are then rotated on a machine at 120 rotations per minute for four minutes. Great care is taken to make sure blood serum from one cell does not leak or jump into a neighboring cell.

After the rotation the slides are put under a microscope. Looking through the microscope you may see many tiny globules or particles. If these are bunched in clumps, the test is positive. If they are scattered, each lying by itself, the test is negative. When the result is doubtful, the test is repeated before the report is made. If the result is still doubtful, two more tests are made with fresh blood samples for each test. This is valuable for detecting syphilis in its early stages.

The very earliest stages of syphilis will not give a positive test, though the patient has the disease and can spread it to others. By the time the second or third sample of blood has been taken, however, the infection may have reached the stage where it will show in the blood test.

Then there is the problem of "dirty dishes" in the laboratory. After the tests have been made, tubes, slides and pipettes for measuring must be cleaned for the next day's work. This dish-washing also proceeds on an assembly line basis, since at least 20,000 tubes and 12,000 pipettes must be cleaned daily. Teams of men and girls work with brushes to get the blood clots out of the tubes and the clear serum poured out. Soak the



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Do You Know?

Blueberries are imported into the United States from Newfoundland.

A new variety of malting *barley* has been developed in Quebec.

Under favorable conditions, *halibut* enjoy a life span of 50 years.

Helicopters are being considered for use in fighting forest fires in the near future.

Cutworms often attack transplanted plants the first night after they are set out.

Popcorn was grown, popped and eaten by American Indians before white men settled the country; it is an Indian gift to the white man's palate and diet.

Plastics have been known for about 75 years, from the time when Hiatt discovered that camphor and cellulose nitrate make a plastic closely resembling ivory.

White pine blister rust, a *fungus* that kills five-needled pines, lives alternately on sugar pine and currant and gooseberry plants; it is controlled by eradicating wild currant and gooseberry plants.

Wilson's petrel, a bird found on the Maine coast, can be distinguished in flight from the Leach's petrel because his yellow feet extend beyond his tail; the other has black feet which do not project in flight.

Rose-colored *blossoms* top many fence posts for barbed wire in Cuba; the posts are young trees, easily propagated, straight-growing, without side branches, but with shoots left at the top to help keep life in the saplings.

tubes in soap suds for five minutes is the rule. They are rinsed not once but 18 times in clean water.

Working at six sinks, cleaning teams can wash 6,000 tubes every 15 minutes. The glass slides are soaked in alkali and rubbed with a window-polishing powder to remove paraffin, oil and other soil. Girls dry these slides with towels, being careful to handle them by their edges to avoid finger smudges that would interfere with the test. The blood tubes and pipettes are oven-dried because this is faster and better.

It looks like voting day at the blood collecting stations.

These are set up in a church or some other convenient neighborhood building. From early morning till about seven in the evening, men and women, and girls and boys over 14 years, line up before a team of clerks who take their names, addresses, phone numbers and ages, and give each person a card and a glass tube numbered to correspond with the number on the white card.

Instead of going to a voting booth, each person goes to a table where a nurse takes blood from an arm vein. The blood goes to the laboratory for testing. Its owner keeps the card and signs it. It certifies that he or she has "submitted blood for a blood test as required by Act 529, General Acts of Alabama, 1943."

Pink slips are made out in duplicate by the clerks. These have the same name-address-age information as the card, and the same number as the card and the tube of blood. They go to the huge tabulating center at the fair grounds. Here they are checked first with OPA records on ration book number three, to make sure that no one is missed in the blood testing. In case a person is ill and cannot go to a blood collecting station, his physician is responsible for getting the blood sample to the health department.

Records Checked

Next the records are checked with health department records of persons already known to be under treatment for syphilis. These can be discarded. Within 48 hours, usually, the code-numbered laboratory reports on the blood tests arrive at the tabulating center. When the test is negative, the record is dropped. Persons who do not hear from the health department within 72 hours may be sure that the report on their blood was negative. They do not have syphilis unless it is in such an early stage, shortly after infection, that it would not show on a blood test.

When the positive reports have been

correlated with pink slips showing name and address, the teams of investigators swing into action. These men and women, specially trained for the work, see each person who had a positive or doubtful blood test and explain that a second test and examination by a physician is necessary.

Such persons report to secondary collecting stations. To these stations also come any who suspect they have gonorrhea. The blood test for syphilis does not detect gonorrhea infection. The examination for that is made at the same time as the examination for syphilis and the taking of the second blood sample.

The four-hour, free-penicillin treatment for gonorrhea can be given at these stations which are in health department clinics, or the patients can go to their doctor's office. At the clinic, the treatment is given by couples, because if the husband has gonorrhea, the wife is also likely to have it. If there is a triangle situation, the other man or woman is sent for to have treatment on the same day—though at different hours. The penicillin is injected into the muscles, one dose every two hours for three doses.

There are three rapid treatment centers for syphilis, the largest in buildings taken over from the Army near the Air Base. Sleeping quarters, cafeteria and other arrangements are very much GI. The other center I saw seemed more like a summer camp with even a swimming pool, and I learned it had been a girl's reformatory.

Men and women are segregated at all centers. Recreational facilities are provided, church services are held and the food is good, if plain. Educational posters and pamphlets on venereal diseases are plentiful.

At these centers, patients get injections of penicillin every three hours, day and night, for nine days. In addition, they get an injection of an arsenical drug every other day and of bismuth on the

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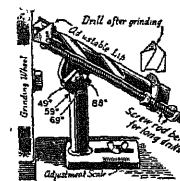
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first, fifth and ninth days. A careful physical examination, including a spinal fluid test, is made when the patients enter the hospital.

The aim of this venereal disease campaign is to stop the spread of syphilis and gonorrhea by finding every infectious case and treating it to eradicate the infection. Late cases of syphilis which are non-infectious are not treated. How much of the venereal disease reservoir can be dried up by this mass attack will not be known until after the final tests are run.

Hundreds of thousands of men, women, boys and girls are being brought face to face, every day, on the streets, cars and buses, with the fact that syphilis and gonorrhea are crippling diseases. They are hearing it every 30 minutes on their radios. They are learning first-hand about the blood test for syphilis. Thousands of them are learning for the first time what these diseases are, the symptoms and effects, how they are caught and how quickly they can be treated and even cured in many cases. The hope is that this knowledge will arm them to some extent against future attacks of venereal disease.

Science News Letter, June 23, 1945

ENGINEERING

Light-Weight Concrete Is Termite-Proof, Cheap

➤ LIGHT-WEIGHT concrete material suitable for building construction, that is fire resistant, insulates against heat and cold, is non-rotting and termite-proof, and cheap to make, has been subjected to laboratory tests during the past year at the University of Michigan and found particularly satisfactory for farm structures where the raw materials are easily obtained. It is made from ordinary portland cement, organic and inorganic fibers, and a small quantity of certain inexpensive chemicals.

The cement in the mixture is the binder; the fibers, obtained from farm wastes, contribute the lightness and bulk, and the insulation properties; the chemicals lessen the amount of cement required, prevent harmful shrinking, and increase the strength. For fiber material, peanut hulls, cotton stalks, rice and wheat straw, cornstalks, flax shives and sawdust can be used. Among the best fibers are materials obtained from the northern jack pine, and winter-cut popple or aspen. Processing these woods is a simple grinding operation.

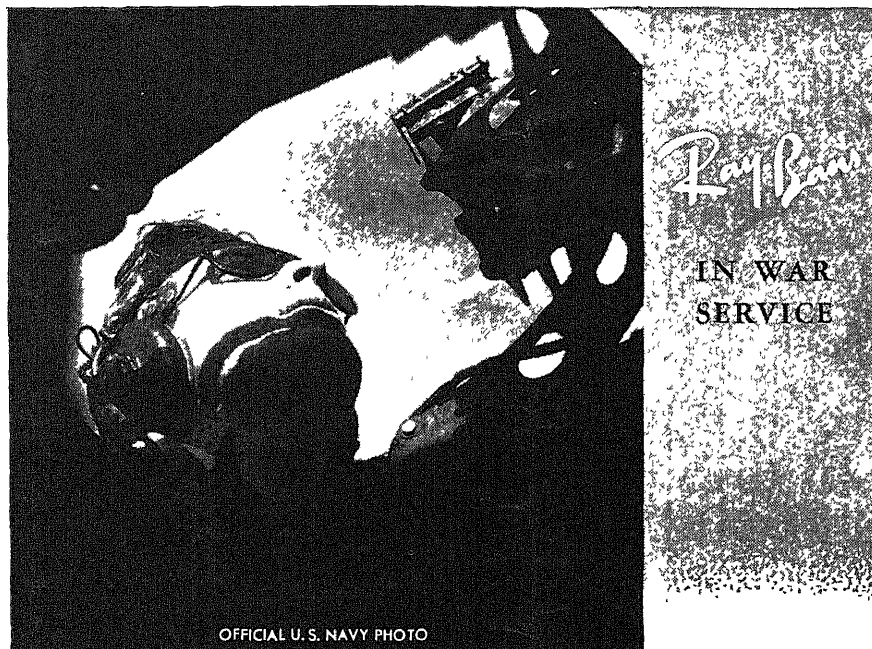
One of the disadvantages of this so-

called insulative concrete is that the fibers require special preparation to remove harmful juices. The juices in ordinary farm wastes, such as straw and cornstalks, usually contain substances that are harmful to the set of the cement. It is not difficult to remove them, but the special treatment requires a certain amount of time.

Proper mixing is also important. Ex-

isting concrete mixers are made to mix heavy ingredients and are not entirely suitable for mixing this bulky light-weight material. They can be used, however, by using slightly more water than is ordinarily considered desirable in cement mixing to obtain the best results.

The insulative concretes vary in weight from one-third to one-half that of ordinary gravel concrete, depending upon the

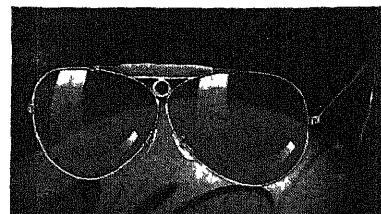
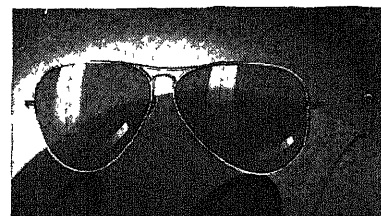


OFFICIAL U. S. NAVY PHOTO

Spotting the Enemy with RAY-BANS



In the top turret of a U. S. Navy Liberator this gunner spends hours upon hours of patrol duty—scanning the brilliant sky for enemy planes, while his crew mates search for submarines and surface craft. Ray-Ban Sun Glasses protect flyers' vision with cool, comfortable scientifically designed lenses and frames. Before the war, you saw Ray-Bans everywhere—at shooting ranges, at lake resorts, on the city streets. Today thousands of pairs of Ray-Bans are in use on the war fronts—protecting precious eyesight from punishing sun glare.



Shown are the distinctive Ray-Ban Sun Glasses and Ray-Ban Shooting Glasses. All Ray-Ban Sun Glass production is allocated to military use.

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mix. Insulative concrete at half the weight of ordinary concrete is more crack-resistant, and at one-third the weight has ample strength for building construction. Two-inch boards of the new material showed, in the tests here, almost as great insulation value as two layers of celotex between facings of plywood and having a total thickness of slightly over two inches.

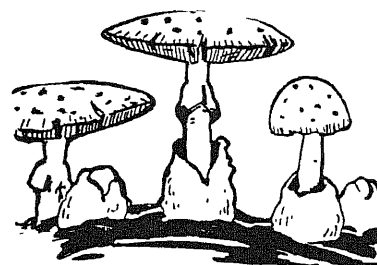
Slabs of insulative concrete will not support combustion but will char when exposed to heat such as a blow-

torch flame. In use the new material will probably usually be cast into slabs and fastened over the building frame

Science News Letter, June 23, 1945

The lower estimates of the temperature of the centers of stars are in the tens of millions of degrees.

Bull moose have been found that stand seven and one-half feet high at the shoulders, weigh over 1,800 pounds, and with antlers spreading six feet or more.



Pass the Mushrooms!

➤ MUSHROOMS are unusually abundant this year, largely as a consequence of the persistently wet weather that has prevailed over the greater part of the country. In moist woodlands and wet meadows where they can commonly be found they are thicker and bigger than ever, and they are very apt to spring up in places where they have never been before—even in your own back yard

Most people fail to benefit by such abundance because they are afraid of wild mushrooms. They will pay fancy prices for a little basket of the common field agaric from the store, and ignore or kick to pieces a clump of exactly the same species that springs up on the lawn. And certain wild species, like the inky-cap and the morel, which are far better than any "boughten" mushroom ever could be, they shun with a double dread simply because they are unfamiliar.

There is some justification for this attitude. To enjoy wild mushrooms with confidence and safety, you have to know them, species by species. There is no dependable rule-of-thumb test. All the supposed tests, like the blackening of a silver spoon or peeling the skin off the cap, are simply worthless. You've simply got to know your mushrooms.

One supposedly infallible test, which condemns mushrooms as poisonous if they are black underneath, runs exactly contrary to fact. The ordinary mushroom that you buy in the market, the only kind that the great majority of us ever get to eat, is black underneath when it is mature. So is that most delicious of all wild mushrooms, the inky-cap—as its name indicates.

On the contrary, the deadliest of all poisonous mushrooms, the Amanitas or death-cups, are innocently white under-

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neath. It is this genus that the amateur mushroom gatherer most needs to learn how to recognize and avoid. Various species of *Amanita* are most abundant, and none of them has any warning taste, as most of the other poisonous mushrooms have. You can cook yourself a nice Borgia banquet of these and be none the wiser until you start to die, so attractive and appetizing are these deceptive fungi.

It is easy enough to recognize an *Amanita*, however. It is the only mushroom that has a ring around the upper or middle part of its stalk and a cup at the base. Some mushrooms have a ring

but no cup; the common agaric of the market-place is one. Others have a cup but no ring; the genus *Lepiota*, most of whose species are edible, is an example. But if it has both ring and cup, let it alone!

Admittedly, this condemns one innocent species along with the guilty. Caesar's *Amanita*, found both in Europe and this country, has the forbidding ring-and-cup combination, yet is not only edible but one of the finest-flavored of all mushrooms. However, for safety's sake it is better for the beginner to give all *Amanitas* a wide berth.

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PRACTICAL MARKSMANSHIP—M. M. Johnson, Jr.—*Morrow*, 183 p., illus., \$2.50. A Study of the Technique of Field Firing. Introduction by Julian C. Smith.

SHORT STORIES OF SCIENCE AND INVENTION—Charles Franklin Kettering—*Educational Service, General Motors Corp.*, 116 p., paper, illus., free. This is the collection of radio talks heard on Sunday afternoons. They are good reading as well as good listening.

WARTIME TECHNOLOGICAL DEVELOPMENTS—Bureau of Labor Statistics—Supr. of Doc., 418 p., 50 cents. A study made for the Subcommittee on War Mobilization of the Committee on Military Affairs, United States Senate. Subcommittee Monograph No. 2.

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• Books of the Week •

BUILDING TRADES BLUEPRINT READING, part 1, Fundamentals, part 2, Specifications, blueprints and examinations—J. Ralph Dalzell—*Amer. Tech. Soc.*, 234 p., paper, illus., \$2 ea.

CINCHONA IN JAVA—Norman Taylor—*Greenberg*, 87 p., illus., \$2.50. Introduction by Pieter Honig.

FIBER TO FABRIC—M. D. Potter—*Gregg*, 314 p., illus., \$2. A Textbook on Textiles for the Consumer.

THE GOVERNING OF MEN. General Principles and Recommendations Based on Experience at a Japanese Relocation Camp—Alexander H. Leighton—*Princeton Univ. Press*, 404 p., illus., \$3.75. Published in cooperation with the American Council Institute of Pacific Relations, Inc.

HANDBOOK FOR SHELL COLLECTORS—Walter Freeman Webb—308 p., paper, illus., \$2.50. Illustrations and descriptions of shells from all parts of the world.

HUMAN ANATOMY AND PHYSIOLOGY—Nellie D. Millard and Barry G. King—*Saunders*, 514 p., illus., \$3. Second edition,

Reset Textbook on elementary anatomy and physiology.

MAMMALS OF THE PACIFIC WORLD—T. D. Carter and others—*Macmillan*, 227 p., illus., \$3. The Pacific World Series. A paper bound edition of this book for the Armed Forces only, was published by the *Infantry Journal* under title of **ANIMALS OF THE PACIFIC WORLD**.

A MANUAL OF SOIL FUNGI—Joseph C. Gilman—*Collegiate Press*, 392 p., illus., \$5. A Book of the Iowa State College Press.

THE MEANING OF RELATIVITY—Albert Einstein—*Princeton Univ. Press*, 135 p., illus., \$2. 2nd ed. with an appendix by the author discussing advances in the theory of relativity.

THE PEOPLES OF MALAYSIA—Fay-Cooper Cole—*Van Nostrand*, 354 p., illus., \$4. Includes the Philippines, Bali and Java, Borneo, British Malaysia and many of the South Pacific islands.

PHARMACEUTICAL CALCULATIONS—Willis T. Bradley and Carroll B. Gustafson—*Lea*, 283 p., \$2.75.

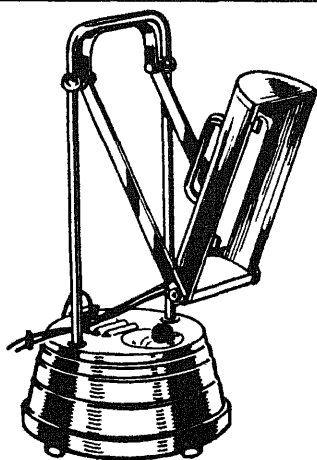
CHEMISTRY

Synthetic Wool from Soybean Protein

➤ **PATENT 2,377,885** was given Oskar Huppert of Chicago, who has assigned it to the Glidden Company of Cleveland, for a process of manufacturing synthetic wool from soybean protein. His process for producing the artificial fiber consists of spinning an alkaline solution of soybean protein into a coagulating acid bath. The inventor claims an improvement in the preparation of the spinning solution consisting of hydrolyzing soya protein with pepsin in a hydrochloric acid solution whereby the degree of dispersion of the protein in the hydrochloric acid is increased.

No decomposition beyond the acid albumen stage takes place, and an alkaline solution is formed. This is aged before spinning.

Science News Letter, June 23, 1945



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New Machines and Gadgets

✿ **PLASTIC DISKS**, soluble in seawater, are used to recover naval torpedoes fired in testing. The disks are mounted on chambers called test heads, that replace the war heads used in action. They dissolve after a short period in the water, releasing a long line and float to mark the sunken torpedo's position.

Science News Letter, June 23, 1945

✿ **ATTACHMENT** for power-driven lawn mowers has been devised by two national Capital parks employees in Washington, D. C., that enables the mowers to be used as cultivators and seeders. One machine with the attachment can seed as much lawn as 30 laborers.

Science News Letter, June 23, 1945

✿ **MOBILE** traffic control signal device consists of the familiar standard, with stop-go lights at its top, mounted in a vehicle to take it to a street crossing where it may be needed temporarily. The vehicle carries a battery to operate the lights.

Science News Letter, June 23, 1945

✿ **FACTORY-ASSEMBLED** planking for highway grade crossings on railroads is made of pressure-cresoted hardwood in panels to fit between the tracks, with other panels outside each track. The five-inch thick strips, fastened rigidly together with spiral dowels, are unaffected by vibration.

Science News Letter, June 23, 1945

✿ **SUNSHINE** and rain are created in a machine used by a rubber company to test the effects of weather on a syn-



thetic rubber-like fabric. With the instrument, illustrated above, the effects of sunlight, periodic rain and temperature changes on the material can be determined in advance.

Science News Letter, June 23, 1945

✿ **RIVET SORTER**, used in an aircraft shop to separate salvaged rivets by lengths, sorts over 15,000 an hour. The rivets, dumped in a hopper, slide down a trough onto a slowly revolving circular plate, and are dropped by trippers of appropriate length into the proper can under the plate.

Science News Letter, June 23, 1945

✿ **SELF-HEATING** food container for

soldiers heats the contents without visible flame or smoke. Approximately 8 by 4 by 1 inches, it has interior compartments separated by inverted V-troughs with open ends. A combustible jelly-like substance, placed in the troughs, is lighted with a match.

Science News Letter, June 23, 1945

✿ **VOLTAMMETER** is an improved type of electrical measurement instrument that contains, in a single sturdy case, an AC voltmeter and an AC ammeter. When plugged into an electric current, this new speed-up instrument gives simultaneous readings of current and voltage.

Science News Letter, June 23, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 264.

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Question Box

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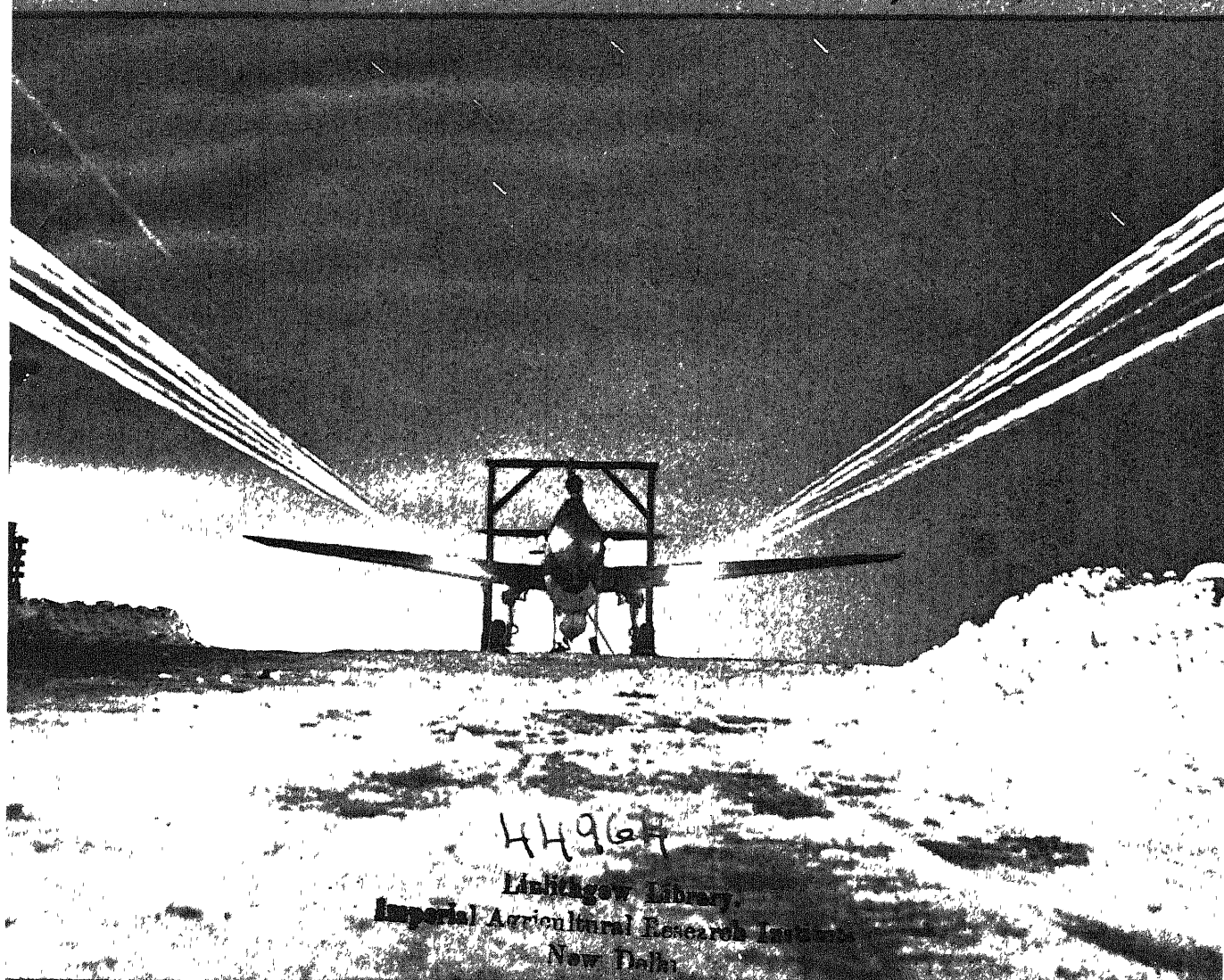
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A SCIENCE SERVICE PUBLICATION

ASTRONOMY

Many Habitable Worlds

Life is possible on thousands of planets. Chances vastly increased by discovery of dark planetary companions of bright stars.

➤ LIFE may exist on thousands of habitable worlds among the millions of small dark planet companions of bright stars throughout the universe, Dr. Henry Norris Russell, Princeton University professor of astronomy, declared.

Explaining that in the sun's planetary system, life has scored twice out of three tries, Dr. Russell holds that it is reasonable to suppose that, within the vast expanse of the universe, there may be many other bodies which actually support life.

There are only three possible habitable bodies in the solar system—Venus, the earth and Mars. The fact that the maximum surface temperature on Venus is probably that of boiling water indicates to Dr. Russell that there is no life on that planet. Life has probably existed and may still exist on Mars, Dr. Russell finds.

"Outside the system composed of our sun and its circulating planets, there was no evidence for the existence of other planets till within the last three years," Dr. Russell said. "Recent precise photographic observations, however, show that several of the nearest stars have invisible companions, revolving about them, which can be detected because their attraction causes the bright stars to move in slightly wavy curves. The smallest of these companions are certainly dark bodies, and may fairly be called planets. We can find small companions of this sort only if they belong to some one of the few hundred stars which lie nearest to the sun. Among the many millions of remoter stars, there are very likely great numbers of them. Though the conditions for habitability are fairly stringent, there may well be thousands or more, of habitable worlds among them."

Life on all these possible worlds is quite unlikely to be in the same stage of evolution as it is on earth today, Dr. Russell said. On some, there may be only primitive forms, he explained. On others, there may be living creatures far surpassing mankind in intelligence and character.

"What these forms of life, high or low, may be, we have no way at all of finding out," Dr. Russell said. "The va-

riety of living things, past and present, on our planet is vast. The material possibilities of life probably outrun the human imagination. Our race has possessed intellectual and moral capacities for something like a thousandth part of the time in which life has existed on earth, and the possibilities in this field presumably transcend our present powers of thought."

Dr. Russell spoke during the intermission of a New York Philharmonic-Symphony broadcast sponsored by the U. S. Rubber Company.

Science News Letter, June 30, 1945

GEOGRAPHY

Rainfall Cycles Connected With Malaria Epidemics

➤ MALARIA epidemics, recurring at intervals of 10 or 12 years, very probably had a good deal to do with the decay of the ancient high civilization of the Near East, Dr. Helmut de Terra, now at Ohio State University, declares in a report

in *Science* (June 22). This recurrence of epidemics he believes is a result of a cyclic recurrence in wet years, making for an abundance of the mosquitoes that carry malaria germs. He further points out a rough correspondence between the wet years and the 11-year major sunspot period.

Several factors help to aggravate the mosquito-breeding situation in wet years, Dr. de Terra suggests. The wet years tend to come immediately after one or two exceptionally dry ones. During the dry years, weathered rock fragments and other debris tend to pile up in stream courses where there is no water to keep them washed out. Then, when the rains come, there is excessive ponding, greatly increasing the potential breeding areas.

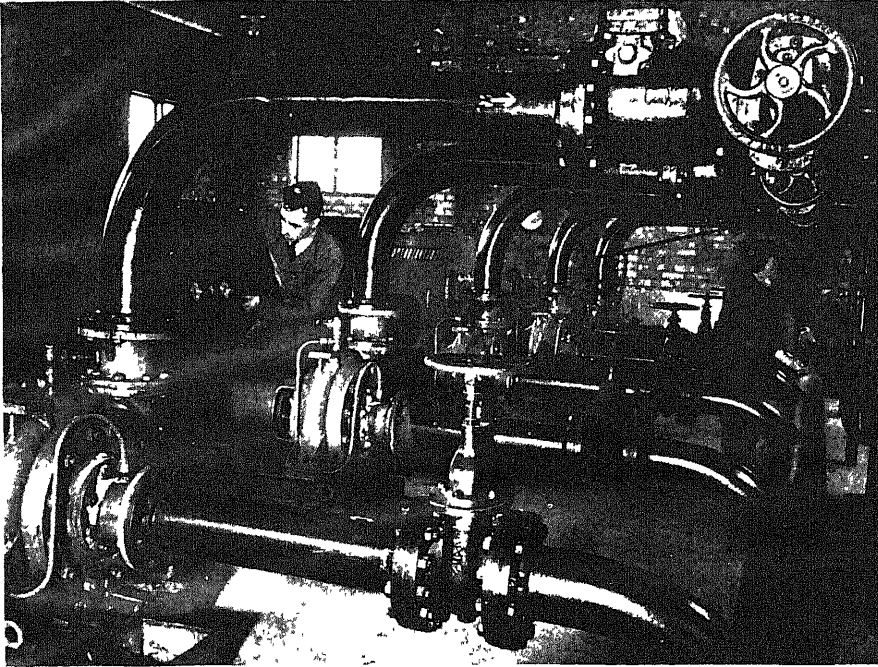
Furthermore, the "lean years" of drought are naturally years of food shortage. The wandering desert Arabs drift into the settled areas near the streams, hunting for food. So when the wet years bring their sudden great increases in the numbers of malaria-carrying mosquitoes, there are unusual numbers of human victims and malaria carriers awaiting them.

Dr. de Terra, who in normal times conducts researches on the antiquity of man in parts of Asia now overrun by the enemy, is visiting professor of geography at the Ohio State University.

Science News Letter, June 30, 1945



FOG DISPERSED—This Royal Air Force Lancaster, its outline blurred through the haze of the fires, is taking off between two bands of flame from FIDO, (Fog Investigation Dispersal Operations), as the fog is dispersed from a British airfield. FIDO provides the necessary heat on airfields to bring about fog clearance by a continuous line of burners installed on each side of the main runway.



PUMPS FOR FIDO—The Sultz pumps, six of which have an output of 80,000 gallons of fuel an hour, supply the pipes down the runways for FIDO. FIDO consists of three main portions—burner light, pumping and distribution and storage. Fog can be cleared in from six to ten minutes. For each plane landed, FIDO uses 6,000 gallons of gasoline. This fog lifting invention played a vital part in RAF Bomber Command's attacks on Von Rundstedt's troops during the critical days of the Ardennes offensive.

MEDICINE

Hope for Dengue Vaccine

Vaccination against "break-bone fever" may result from first success in giving disease to mice. Prisoners volunteer for tests showing immunity can be produced.

➤ **HOPE** that vaccination against dengue, or "break-bone fever," may be achieved appears in a report by Lt. Col. Albert B. Sabin and Capt. R. Walter Schlesinger, of the Army Epidemiological Board and the Children's Hospital Research Foundation. (*Science*, June 22.)

Dengue, though not fatal, is a painful, very weakening disease spread by the same mosquitoes that carry yellow fever. It has occurred in the southern part of the United States and there have been outbreaks in New Guinea and Hawaii. Because of the disability it causes through its weakening effect, it could be a problem to an army fighting in regions where it is prevalent.

Inmates of the New Jersey State Prison, who volunteered for the studies, have been given immunity to this disease by injections of dengue virus which had

been propagated in mice. The feat of establishing the virus in mice has never before been accomplished although a number of attempts have been made.

The virus becomes modified by transmission from one mouse to another, so that it causes a progressively less severe disease. The volunteers from the state prison actually got, along with their immunity to dengue, a mild attack of it. It was no more severe, the scientists report, than the reaction following typhoid vaccination and consisted of fever with or without headache and sickness for 24 hours or less. A marked, extensive rash, which is one of the symptoms of dengue, also followed the immunizing dose of the virus.

Evidence that the virus gave protection against dengue came when the volunteers failed to get the disease after being

bitten by mosquitoes carrying the virus. When four unprotected volunteers were bitten by mosquitoes from the same infected lot, they all developed typically severe unmodified dengue.

Ideally, of course, a vaccine gives protection against a disease without producing a mild attack of it and such a vaccine for dengue may yet be produced. The modification of the virus by passage through mice has already become so marked, the scientists report, that this virus "could be used as a vaccine for the production of immunity against dengue."

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ASTRONOMY

Protect Your Eyes When Watching July Eclipse

➤ **NO ONE**, of course, should ever look right at the sun with unprotected eyes, so if you want to watch the sun as it hides behind the moon early on the morning of July 9, you should find some used photographic film or smoked glass. To look at the sun directly would be running the risk of permanent damage to your eyes and possibly blindness.

Smoked glass is an old standby for solar observations. Just get a piece of glass (a large piece from a broken window-pane will do) and hold a flaming candle beneath it until one side is well coated with soot. Set it aside carefully, with the sooty side up, so that none of the coating will be brushed off before use.

Even better than a smoked glass, which has to be handled with care, is an old densely exposed and developed photographic negative. Make sure that all parts of the film are dark as even a few light spots may permit the sun's rays to reach your eyes. Your sun glasses probably are not thick enough to permit you to look directly at the sun, but welder's glasses (if you have a friend who can lend you some) are good. But don't look at the sun too long, no matter how well your eyes are protected as a few injurious rays not stopped by the glasses or film may get through.

If you have a small telescope, with a tripod, or some other firm support, it may be used. There are special solar eyepieces for telescopes, which reduce the light sufficiently to permit the observer to look right through the telescope when pointed at the sun. Still more convenient, however, and permitting several people to look at the same time, is a white screen, placed where the back of one's

head would be if looking through the telescope.

A collar, consisting of a cardboard disk with a hole cut in the center, may be placed around the telescope to shield the screen from the direct rays of the sun. Then, if the instrument is pointed at the

sun, and it is focused by pulling the eyepiece in and out, an image of the sun several inches in diameter can be seen on the screen. Perhaps even a few sunspots will be visible on the screen before the moon begins to creep across its face.

Science News Letter, June 30, 1945

INVENTION

Patents to Be Licensed

➤ A NEW service to American inventors and businessmen is being offered by the U. S. Patent Office. Beginning this week, a register of patents available for licensing or sale will be published in the weekly *Official Gazette* of the Patent Office, to help establish contact between manufacturers looking for good and profitable articles to make and inventors or owners of unexpired patents on such gadgets. This service is expected to be especially useful to small manufacturers.

Procedure will be of the simplest. Formalities are wiped out altogether. There are no blanks to fill out, no questionnaires to answer. All the patent owner needs to do is write an ordinary letter to the Patent Office, giving the number of the patent he owns and attaching a printed copy, and stating that he is willing to license or sell same on reasonable terms. If he doesn't happen to have a copy of his patent on hand, he can attach an order for a copy, enclosing a dime to pay for it.

If he cares to state definitely the terms on which he will license or sell, they will be included in the statement in the Register; otherwise the "reasonable terms" clause will leave him free to drive his own bargain with the licensee, either directly or through an attorney or other agent.

Likewise free of formalities are the brief abstracts prepared in the Patent Office as guides to possible licensees. The interminable, and often unintelligible, technical jargon in which patent attorneys usually couch patent claims is all tossed overboard, and the essential nature of the device offered is set forth in a score or so of words in plainest English. A sample: "Book-type toilet kit or the like with clamp inside so arranged that clamp acts as support when case is open and in use."

In publishing this register of licensable patents, the Patent Office is not assuming any responsibility to either the patent owner or the licensee. On the one hand, it does not guarantee the practicability of any invention; on the other,

it offers the patent owner no assurance of the business standing of the would-be licensee. The suggestion is offered that the owner use "methods any prudent individual might observe, such as credit reports, business ratings, etc."

The Patent Office is undertaking one further service: it is setting up classified mailing lists for businessmen interested in specific types of inventions as they are added to the new Register. Thus, if a manufacturer is interested in, say, shoes, or fountain-pens, or coffee percolators, or flashlights, he will ask to have his name placed on the appropriate mailing list. Thereafter he will receive notices of such patents as are listed in that particular category, without having to wade through a lot of descriptions about which he cares nothing.

Copies of the Register will be sent regularly to trade journals, for publication if they so desire. Even the preliminary notices that have appeared this month in only a few such publications have already resulted in something over 100 inquiries from interested manufacturers.

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PUBLIC HEALTH

Polio Cases Increase, But No Sign of Epidemic Yet

➤ INFANTILE paralysis cases have increased slightly throughout the nation and are above the total for this time last year. No signs of an epidemic have appeared yet, however.

The total number of cases reported to the U. S. Public Health Service for the week ending June 16 is 99. This is four more than for the previous week.

Most of the cases are scattered about the country except for 37 reported from Texas, the largest number from any one state. New York, with 10 cases, had the next highest number. Fear of an epidemic in Texas led to a request from health authorities there for U. S. Public Health Service aid. Their Dr. A. G. Gilliam has been sent to Houston which, on June 9, reported 10 cases with two

deaths. The state's total of 42 cases for the week of June 9, however, dropped to 37 the week of June 16, and Houston had only eight cases this past week.

Since Jan. 1 this year, 999 cases of infantile paralysis have been reported, a considerable increase over the 657 reported during the corresponding period in 1944. While this might seem alarming, health authorities point out that some of these cases represent a carry-over into the first months of the year of cases that really were part of last year's epidemic.

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ASTRONOMY

Metals Float Above Gas

Mt. Wilson astronomers confirm theory that cool metallic clouds of iron, vanadium and titanium partially absorb the light from hot hydrogen.

➤ INCREASED light-efficiency of the 100-inch reflector, due to faster photographic plates and to optical apparatus of improved design, has enabled astronomers of the Mt. Wilson Observatory to obtain large-scale photographs of the spectra of certain red stars which confirm and extend an hypothesis advanced nearly half a century ago. The results of the investigation have been announced by Dr. Paul W. Merrill in the *Publications of the Astronomical Society of the Pacific*.

Light from most stars, when spread out into a rainbow-colored band or spectrum, is found to be crossed by a series of dark lines due to hydrogen gas in their atmospheres. The first line of the series is in the red, the second in the blue, the third in the violet, etc., the strength of the series decreasing in a regular way from red to violet.

In many red variable stars, however, the hydrogen lines, instead of being dark, are bright during a part of the cycle of luminosity of the star. A most puzzling feature is the irregular strength of the lines, the series having what Dr. Merrill describes as a "mutilated" appearance, which is without counterpart in any other type of star.

For years it has been known that the surface of these stars is covered by cool clouds of metals, such as iron, vanadium, and titanium. These clouds partially absorb the light emitted from the hot hydrogen gas below them, thus producing many of the observed irregularities in the strength of the bright lines.

Confirmatory evidence to this effect was supplied by comparing the structure of certain ultraviolet bright hydrogen lines in the spectrum of the red variable star, Omicron Ceti, with the spectrum of the red star, Beta Pegasi. The spectrum of Beta Pegasi closely resembles that of Omicron Ceti except that it lacks the bright hydrogen lines. The comparison revealed close agreement between depressions in the bright hydrogen lines in Omicron Ceti and dark lines due to metals in Beta Pegasi, conclusive evidence that the mutilated appearance of the series is due to the influence of cool metallic clouds which

must lie above the glowing hydrogen.

A mystery still unsolved is why hydrogen gas shines so brightly in red variables like Omicron Ceti which are among the coolest known stars, having a surface temperature estimated at only 4,000 degrees Fahrenheit. To make hydrogen shine requires some special source of energy supply which astronomers have not been able to identify. Dr. Merrill believes the changes in strength of the bright hydrogen lines are closely connected with the mechanism causing the variations in the brightness of the star as a whole.

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PSYCHOLOGY

Chimpanzees Valuable for Psychological Research

➤ CHIMPANZEES do not suffer from mental disease, Dr. Robert M. Yerkes of Yale University revealed.

"Among the hundreds of chimpanzees which I have met or used in experi-

ments," he said, "I have seen not one with a malignant growth, and none insane. Why this signal difference between them and us in the incidence of such dread diseases? Have they immunity, or a better way of life than ours?"

Chimpanzees, which look like a caricature of man, actually are strikingly like man in both bodily functions and behavior, Dr. Yerkes said. They are subject to most human diseases. For that reason they are important as laboratory animals for medical research. According to modern medical opinion, the chimpanzee is the only animal known to be susceptible to the common cold.

But the value, however great, of the chimpanzee for medical research is out-ranked, Dr. Yerkes indicated, by his usefulness for psycho-biological research.

"I have especially in mind studies, of which many are in progress, planned to extend and perfect our knowledge of normal human growth and development and our skills in the use of educational and other methods of guidance . . .

"Chimpanzees happen to be almost ideal subjects for experimental studies of behavior and of the conditions which affect it; for inquiry into the role of heredity versus that of environment and education; for studies of learning or ability to profit by experience; of social relations and intimations of culture. . . .

"Already studies of anthropoid apes



"MAIN" STREET—Seabees lay down steel mats which are later filled with coral rock to make a smooth surface for the main street at a Southwest Pacific Navy base. In the background are the Seabee tents hidden from sight of enemy planes by towering coconut palms.

and other experimental animals have gone far towards shattering the prevalent assumption or supposition that human nature can not or should not be changed or improved."

MEDICINE

Leukemia Case Puzzling

Marked improvement in three-year-old girl with acute lymphocytic leukemia baffles physician. Gasoline inhalations not believed responsible.

➤ THE "QUITE marked improvement" in three-year-old Diana Peel of Waterloo, Iowa, who has been suffering from leukemia has baffled her physician, Dr. Frank T. Hartman.

He cannot find any scientific explanation for it and has taken a "fingers crossed, rap on wood" view of the case, he stated in response to a query.

Diana has acute lymphocytic leukemia, a disease of the blood-forming organs which medical records show has always been fatal. The diagnosis, based on clinical symptoms and blood findings, was verified by Dr. Samuel Amberg, child specialist at the Mayo Clinic.

Diana at no time was given blood transfusions, X-ray treatment or any kind of treatment because the case was considered hopeless from the start.

The only treatment, if it can be called that, which Diana has had has been a strange sort of home remedy, inhalation of gasoline fumes. "It probably does not

Dr. Yerkes spoke during the intermission of a New York Philharmonic-Symphony broadcast over CBS sponsored by the United States Rubber Company.

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have a thing to do with the quite marked improvement in this child's condition," Dr. Hartman states, prefacing his account with "You may take it for what it is worth."

Here is what happened: While Diana was most seriously ill she was taken for a drive. Her family discovered when purchasing gasoline that she developed a desire, almost a mania, to inhale gasoline fumes. This the family allowed her to do, on repeated occasions each day, from a cloth saturated with gasoline.

"So many things are happening in medicine that are not altogether scientific that it might be possible this is one of those happenings," Dr. Hartman says. "Animals live by instinct and their sense of smell. Maybe babies and other human beings live in part the same way. Let us hope so in this case. Better keep our fingers crossed," he adds, "and rap on wood."

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of standard colors, prepared with known amounts of phenol, is used to measure the amount of phenol liberated, and thus the test shows the amount of unpasteurized milk product present or the extent of underpasteurization of the milk used.

More than 340 samples of Cheddar cheese, for which records of the treatment given the milk were available, were tested by this method. All samples of cheese made from raw milk or underpasteurized milk were detected, regardless of the age of the cheese.

Dr. Sanders presented this method for detecting unpasteurized or underpasteurized milk-cheese at the meeting of the committee on Standard Methods for Examining Dairy Products, American Public Health Association, in New York City.

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AERONAUTICS

Airmail Delivery by Parachute Is Probability

➤ AIRMAIL delivery by parachute to thousands of small towns in the United States is a probability of the near future. Tests made at the National Airport in Washington demonstrate that it can be successfully carried out, using a special conveyor to eject the mailbag and a special parachute to land it safely on the ground. The demonstration was by the Pennsylvania-Central Airlines and the Switlik Parachute Company.

The airline company perfected the method by which mail sacks, equipped with parachutes, can be efficiently and accurately dropped from low-flying transport planes. In the demonstration a plane flew at 130 miles an hour about 200 feet over the airport and ejected groups of sacks and parcels through a rear door by means of a conveyor designed by company engineers. Opened by a static line, the parachutes fell free for a few feet, billowed and dropped slowly, all landing within a short distance of each other.

Each parachute is packed in its own canvas bag, with the open-end-flap closed by snap-button fasteners. The parachute sack is attached to and remains with the mail bag during its descent. The mail bags are ejected from the conveyor and the plane when the pilot trips a trigger. A static line, with one end attached to the plane and the other end to the apex of the parachute canopy, withdraws the canopy as the load falls away. The line breaks, the canopy inflates, and the cargo descends slowly to the ground.

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CHEMISTRY

Raw Milk Detected

➤ A PRACTICAL method for readily determining whether the milk used in making Cheddar cheese was pasteurized has been developed by dairy experts of the U. S. Department of Agriculture. The addition of as little as 0.1% of raw milk to properly pasteurized milk, or a decrease of two degrees in the pasteurizing temperature for 30 minutes, can be detected by this new, improved test, a modification on the phosphatase test commonly used in testing milk for adequate pasteurization.

Although laws in various parts of the United States restrict the sale of raw milk for drinking, only a few states such as California, Illinois, Indiana and New York require that all cheese sold be made wholly from pasteurized milk, or that the cheese be cured for a definite period of time prior to its sale. Outbreaks of

various diseases such as typhoid fever and undulant fever have been attributed to the consumption of cheese made from unpasteurized milk and cured for only short periods of time.

The new method for detecting the use of unpasteurized milk products in cheese was developed by Dr. George Sanders and Oscar S. Sager of the Bureau of Dairy Industry, and is based on the fact that the enzyme phosphatase, present in raw milk, is destroyed when milk is satisfactorily pasteurized.

In the test disodium phenyl phosphate is added to the cheese to be tested. If any phosphatase is present, it splits this organic phosphate, liberating phenol in proportion to the amount of phosphatase activity present. A reagent is added which, reacting with the phenol, develops a rich blue indophenol color. A scale

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ASTRONOMY

July Brings Eclipse

The first total eclipse of the sun visible in the U. S. and Canada since 1932 and the last until 1954 is the chief astronomical event of July.

By JAMES STOKLEY

► THE FIRST total eclipse of the sun visible in the United States and Canada since August, 1932, and the last until 1954, is the chief astronomical event of July. It occurs on July 9. Only along a narrow path beginning in Idaho, crossing Montana, Saskatchewan, Manitoba, Hudson Bay, Greenland, Norway, Sweden, Finland and Russia, will the moon be seen to cover completely the disk of the sun. But throughout practically the whole of North America and Europe there will be a partial eclipse, with more of the sun being hidden the nearer one is to the path of totality.

In New York City the moon will begin to encroach on the solar disk at 7:07 a.m. E.W.T.; the eclipse will be at its maximum at 8:03, with 57% of the sun's diameter covered, and the moon will move completely off the sun at 9:04. Atlanta, Ga., will see only 52% of the solar diameter hidden, at 7:51 a.m. There the eclipse will start at 7:01 and end at 8:46. Chicagoans will be able to watch the eclipse from 6:08 a.m. to 8:02 a.m., C.W.T., with the maximum, 73%, at 7:02 a.m. At Denver the eclipse will start before sunrise; the maximum, 84%, will occur at 6:03 a.m., M.W.T., and the end at 6:58 a.m. In southern California even the middle of the eclipse will occur before sunrise. In the vicinity of Los Angeles the sun will rise with 16% of its diameter covered, and the end will come soon after, at 4:55 a.m., P.W.T.

Usual Summer Display

As for the evening sky in July, we then will see the usual summer display of stars, and one planet—Jupiter—low in the northwest in the constellation of Leo, the lion, as indicated on the accompanying maps. These show the appearance of the heavens at 11:00 p.m., your own kind of war time, July 1, and 10:00 p.m. in the middle of the month.

It is to the south, however, that we find the most characteristic of the summer constellations, Scorpius, the scorpion, with the ruddy star Antares. To the right of Scorpius is a fainter group, Libra, the scales, and to their right is

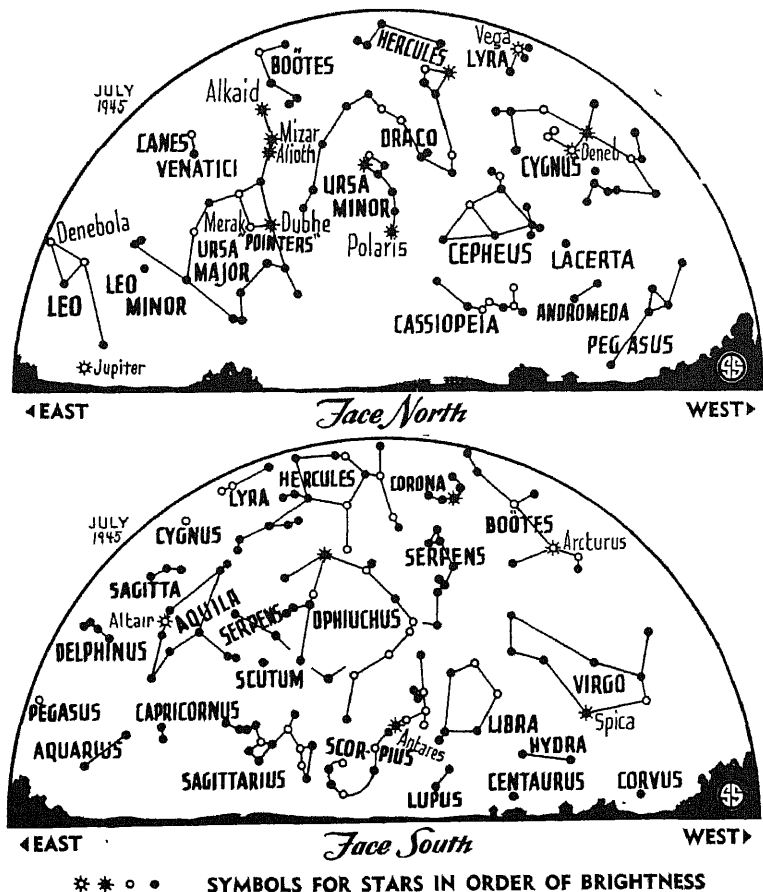
Virgo, the Virgin, with first magnitude Spica. Above Virgo is Bootes, the bear-driver, with brilliant Arcturus. This is in the west, and in the opposite direction, high in the eastern sky, is another brilliant orb, Vega, in Lyra, the lyre. Two bright stars can be seen below Vega. The one to the right is Altair, in Aquila, the eagle, and to the left stands Deneb, in Cygnus, the swan.

Two other planets are visible later in the night. Both Venus and Mars are in the constellation of Taurus, the bull, which comes up in July just before the sun, so in the early morning these two can be seen to the east. Venus, the brighter, is a little lower than Mars. Saturn is in line with the sun July 6, and invisible, but at the end of the month it will rise about two hours before sunrise. Mercury, innermost of the planets,

will be in the evening sky around July 23, but it sets so soon after the sun that it will hardly be visible.

Were this not wartime, the total eclipse on July 9 would doubtless be far better observed in this country than it actually will be. Although in the past astronomers from the U. S. Naval Observatory have traveled halfway around the world to observe an eclipse, they have no official expedition this year, as the Navy is busy with other matters. Probably some of the most extensive observations this year will be made in Russia where, long before the collapse of Germany, an elaborate eclipse program was being planned. Another eclipse in Russia a few years ago was observed extensively, even though this was during the dark days of the siege of Stalingrad.

If one could get there, and if the weather conditions were satisfactory, Greenland would be the best place to see the eclipse on July 9. There the eclipse occurs at noon, with the sun at its highest for the day; and the sun is hidden for a minute and 15 seconds.



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Farm tractor tires, inflated 100% with a calcium chloride solution, remain inflated in use or in storage, and have longer service-life because of minimum shippage and constant correct pressure.

Investigations made by government scientists lead to the prediction that the Alaska salmon pack for 1945 will be somewhat larger than in 1944 but still about 15% below normal.

Fontana lake in western North Carolina, which will result from the new Fontana dam, will have a 215-mile shore line; the dam is 450 feet high, the fourth highest in the world.

Chemically about 50% of the wood of white pine is cellulose, 25% lignin, and the rest sugars, resin wax, acetic acid and pentosan; all of these have valuable industrial uses.

The dormouse usually hibernates for six months, and a sudden coercive wakening may be fatal.



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See Ad EN(11b)

At Rybinsk, in Russia, the eclipse lasts only 50 seconds, and occurs late in the afternoon.

In the United States and Canada, on the other hand, the eclipse occurs early in the morning. At Pine River, Manitoba, which is the most eastern point that can be reached directly by rail, the total eclipse occurs at 7:16 M.W.T., with the sun only 13 degrees above the horizon and a duration of 36 seconds. Butte, Mont., is in the path of totality. In the center of the path, a little south of the city, the sun is hidden for 25 seconds, when it is about 3 degrees above the horizon. Three degrees is about six times the sun's apparent diameter. Thus, if a person in this region wants to see it he will have to go to a place where there is a clear eastern horizon, otherwise buildings or hills might hide the sun. However, even though it is so early in the morning, chances for clear weather are fairly good.

As the moon covers the disk of the sun, there flashes into view the solar corona, its outermost region. Until a few years ago this could be seen only at eclipse time. Now astronomers have developed special instruments which enable them to study its brightest parts on other occasions, but only at an eclipse can the fainter extensions of the corona be observed. Thus, many of the observations that will be made by small astronomical groups will be concerned with this feature. Others may study the spectrum of the corona, or the spectrum of the last bit of the sun that remains visible an instant before totality and, of the first, which appears a moment after it is over.

Still other observations will be con-

cerned with the brightness of the sky while the eclipse is at its height. Although a few bright stars and planets appear when the sun is hidden, it will probably get no darker than a medium twilight. The reason for this is that the air outside the shadow of the moon scatters considerable light into the shadow.

But aside from its scientific value, an eclipse of the sun is the most impressive of all natural phenomena. After this year the next total eclipse visible in the United States and Canada will come on June 30, 1954, when the path crosses Nebraska, South Dakota, Wisconsin, Michigan, Ontario and northern Quebec. With travel restrictions what they are it will be difficult for sightseers to go to the eclipse this year, but anyone in the path of totality will certainly be repaid by getting up early to see this celestial show.

Celestial Time Table for July

July	EWT	
2	2.13 p.m.	Moon in last quarter
4	10 00 p.m.	Moon nearest, distance 228,900 miles
5	6.00 a.m.	Earth farthest from sun, 94,452,000 miles
9	9 35 a.m.	New moon, total eclipse of sun
11	6.17 a.m.	Moon passes Mercury
14	8.12 a.m.	Moon passes Jupiter
17	3.01 a.m.	Moon in first quarter
	8 00 a.m.	Moon farthest, distance 251,200 miles
23	4 00 p.m.	Mercury farthest east of sun
24	10.25 p.m.	Full moon
28		Meteors of delta Aquariid shower
30	2.00 a.m.	Moon nearest, 229,300 miles
31	6 30 p.m.	Moon in last quarter

Subtract one hour for CWT, two hours for MWT, and three for PWT

Science News Letter, June 30, 1945

An odorless fly spray, that will not irritate the skin or nose of the user, has been developed by U. S. Department of Agriculture chemists

ERRATA, Vol. 47, Nos. 1-26, January-June, 1945

PAGE	TITLE BEGINS	CORRECTIONS
19	Productivity Increased	Experiments were by Prof. Victorov instead of Peterburgsky.
21	Vegetables	Par. 4, line 5, after ponics, delete rest of paragraph.
24	Ancient Maori God	See SNL March 24, 1945, p. 181.
79	Books	Par. 2, line 4, Dickinson for Dickinson
92	Do You Know	Par. 9, line 4, bearded for bearded.
126	Weapons	Col. 2, line 12, delete Congressional; line 13, delete and Development.
153	Simple Chemical	Line 3, and for replace.
185	Earthworms	Phenomenon not new.
195	8,000 Pictures	Col. 2, line 6, millionth for thousandth.
229	Chile	Line 9, Arica for Africa
234	Plant	Tomato mentioned is Pan-America, not Pan-American.
249	Nine Out of Ten	Par. 4, line 6, after 1915, insert as shown in reports from the Birth Registration States.
276	National Academy	Col. 1, line 7, Dr. Hibbert is a chemist, not a biologist.
321	Cover caption	Supersonic Speeds for Supersonics.
328	Cancer	Line 2, Prostate for Prostrate
328	Astronomy Offers	Col. 2, line 5, delete the oscillations of.
329	Study of	Line 10, Washington University for the University of California.
343	Physics Laboratory	Last par., line 3, respiration and function of capillaries for vitamins.
346	Blood	Col. 3, line 7, to read, child having one parent with only Rh positive inheritance and.

PYROTECHNICS

War's Fireworks

Brighter skies are predicted for future Fourth-of-July displays. Can-like "candles" emit great clouds of smoke in six assorted colors.

By FRANK THONE

See Front Cover

➤ **FOURTH-OF-JULY** celebrations have always meant the noisy and spectacular burning of a lot of gunpowder. We seem to get a more satisfactory feeling of independence and national power if we devote one day in the peaceful year to making noises and flashes and smoke-clouds like those of war. Even in those parts of the country where of recent years the idea of a "safe-and-sane" Fourth has come to prevail, the younger generation has usually had to be appeased by being taken to see a big public fireworks display in the evening.

Because we do celebrate by reproducing, as well as we are able, the lightnings and thunders of battle, it is more or less inevitable that our fireworks shall be influenced by our weapons. Our earliest Independence Day celebrations consisted mainly in banging away all day long with blank charges from the old Revolutionary War cannon parked on the village green. Or, if the village could not boast such a heroic relic, there were always plenty of flintlock muskets and horse-pistols that would make acceptably noisy substitutes.

The showier night fireworks, that came along a little later, had their military counterparts also, in the rockets and flares used for signalling on the battlefield and from ships. Rockets, apparently, were weapons of deadly combat even before they became signal lights and means of patriotic entertainment. "The rockets' red glare," immortalized by Francis Scott Key, came from iron-cased projectiles carrying bursting charges of gunpowder, that were the ancestors of the present war's multiform rocket artillery.

Effects of War

If earlier wars thus influenced the evolution of fireworks, it is only reasonable to expect future Fourth of July to show the effects of this one, with its unprecedented rate of invention and application of new devices and techniques.

Rockets, already mentioned, are not at

all a new weapon; their smoky trail goes back into medieval Europe and beyond that into ancient China. But present-day methods for launching them in massive volleys or rapid fusillades have made them virtually a new means of warfare, and the same multiple launchers and electric firing can be adapted to professional-scale pyrotechnic displays, with spectacularly brilliant results.

What we have learned about more efficient and accurate rocket propulsion in war may also be applied with profit to the less deadly fireworks of peacetime, even for individual front-lawn celebrations. The traditional but clumsy paper-and-stick construction may soon give way to more compact types, cased in light metal or perhaps in plastic, with launching-tubes to insure that they will start their flight properly, and not end it ignominiously (and dangerously) on a neighbor's roof. It is even possible that the "spinner" type of rocket, found most accurate for military purposes, may replace the old familiar stick-guided type.

Flares and aerial bombs, old standbys of professional pyrotechnics though less used in private celebrations, may take

a leaf from the soldier's manual, too. Hitherto they have been fired from what amount to one-use mortars, made of laminated cardboard. Fighting forces, however, have found that their adaptations for night signalling and illumination can be very advantageously discharged from the same type of mortars that throw high-explosive, incendiary and chemical shells.

Very high rates of fire can be maintained by simply dropping the projectiles one after the other into the up-turned muzzle. Pyrotechnicians may find it to their advantage to buy up some leftover 60-millimeter mortars after the war, or even to develop some specially adapted mortars of their own.

Some particularly gorgeous pyrotechnic effects can be obtained with white phosphorus, which has been much used in the present war as an incendiary. However, this military value of phosphorus will probably tend to discourage its use for display purposes—just too much chance of setting fire to things. The dense white smoke given off by burning phosphorus, another of its military advantages, becomes a handicap to its use for Fourth-of-July purposes.

Tracer ammunition is another kind of warlike fireworks that is regrettably unsuitable for peacetime displays. Tracer bullets, like those shown on the front

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cover of this SCIENCE NEWS LETTER, from either airplane or ground guns, writing their dotted lines of fire across the night, never fail to bring admiring "Oh's" and "Ah's" from civilians who see the show.

But unfortunately they are still bullets, capable of killing at long ranges. So unless there is an unlimited stretch of empty ocean, swamp or desert available this type of fireworks is not likely to outlive the war.

Colored Smoke

One of the really new inventions of World War II that is practically certain to win favor as day fireworks is colored smoke. Can-like "candles" that emit great clouds of smoke in six assorted bright rainbow hues have had extensive use in both land and sea fighting as signals and means of identification. Their effect is absolutely beautiful, especially under bright sunlight. They can supply something of the brilliance of night fireworks to daytime celebrations.

As used in the war, these colored smokes have always been set off on the ground. However, there is no reason for such limitation. Gorgeous effects might be obtained by firing them upward from mortars, letting them trail pillars of bright cloud behind them, or dropping them from airplanes, like showers of variegated daytime comets. Or they might be attached to the plane itself, while the pilot does a little stunting. Imagine sky-writing in Technicolor!

Airplanes have been used in a rather limited way in the past, for displaying fireworks of various kinds. Now that there are hundreds of pilots who have become skilled in the launching of high-explosive rockets under the toughest of combat conditions, we can surely expect some of them to be ready to lend their ability, in postwar Fourth-of-July celebrations, to making the night skies bright with brighter missiles that will be the symbols of victory and peace.

Science News Letter, June 30, 1945

ETHER AND MATTER

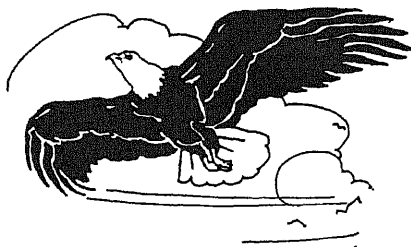
by C. F. Krafft (1945 edition)

CONTENTS. The Hypothesis of a Hydromechanical Ether—Classical versus Einsteinian Relativity—The Red Shift—Gravitation—The Constitution of the Sun and Stars—Electromagnetism—Theories of Atomic Structure—Introduction to the Vortex Atom—Vortex Atom Structures—The Heavier Elements—Living Matter.

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C. F. KRAFFT

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National Emblems

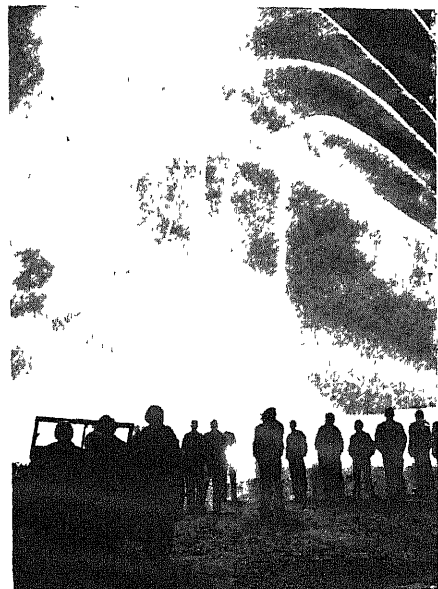
➤ **FOURTH-OF-JULY** orators don't "scream the eagle" as they used to; oratory of that kind has largely passed out of fashion—except occasionally in Congress. But the eagle does figure prominently in patriotic cartoons about this time of year, and we still do feel a thrill of admiration for that magnificent bird—even though we have all but exterminated it in most parts of the country where it used to be abundant.

It is appropriate that by general consent the eagle, legislated as part of our national Great Seal and as a device on most of our coins, should be the white-headed, or bald, eagle, though it was not so specified at the time. The other eagle seen occasionally on this continent, the slightly larger golden eagle, occurs in Europe and Asia as well, and has figured in imperialistic heraldry all the way from Assyria and Rome down to Napoleonic France and Czarist Russia; so we prefer to have none of it.

Only one other claimant for honors as the national bird has ever been put forth: the wild turkey. Benjamin Franklin offered good arguments for the turkey against the bald eagle, and the great naturalist Audubon backed him up. But nothing ever came of it.

If we should ever wish to have a four-footed animal emblem, the vote would probably go heavily in favor of the bison, or American buffalo. This impressive animal figures on the seal of the Department of the Interior, and was familiar for about a generation on the "buffalo nickel", only now being retired from circulation.

No national flower has ever been chosen for this country. Support seems fairly evenly divided between two: goldenrod and columbine. Goldenrod, being a composite flower, teaches the



V-E DAY—The boys of the Twelfth Air Force B-25 group celebrated by firing a lot of signal flares into the air with a most brilliant Fourth-of-July effect.

lesson, "*E Pluribus Unum*." It suffers, however, from the almost wholly baseless accusation of being a hayfever weed. The columbine seems to enshrine the name of Columbus; though actually the name of the great discoverer and the name of the flower go back to a common source, the Latin word for dove. By a curious irony, the botanical name of the columbine, *Aquilegia*, is said (though somewhat doubtfully) to be derived from the Latin name for an eagle.

Neither is there an officially adopted or popularly accepted American tree. A likely candidate would seem to be the American elm. It was under a giant of this species that Washington accepted his commission as General of the Continental Army, and other great elms have figured in more than one episode



WYOMING

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the history of our country. If only we can save our elms from the menace of an insidious alien enemy that attacks from within, the elm disease, it might be appropriate to celebrate the victory

of science in this battle by appropriate legislative and educational action, to make this tree mean as much to us as the oak does to England.

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Books of the Week

AIRPLANE CRASH FIRE FIGHTING MANUAL—National Fire Protection Association, 96 p., illus., \$1.

S T M STANDARDS ON CEMENT, with RELATED INFORMATION—A S T M Committee C-1 on Cement—Amer Soc for Testing Materials, 169 p., paper, \$1.50. Specifications, methods of chemical analysis, and physical tests are included.

THE DISTRIBUTION OF THUNDERSTORMS AND THE FREQUENCY OF LIGHTNING FLASHES—R. Ruedy—National Research Council of Canada, 75 p., paper, illus., \$1. Second edition, revised and enlarged.

THE HISTORY OF SURGICAL ANESTHESIA—Thomas E. Keys—Schuman's, 191 p., illus., \$6. An introductory essay by Chauncey D. Leake, and a concluding chapter, the Future of Anaesthesia by Noel A. Gillespie.

HOW TO KNOW MOSSES—Henry S. Conard—Wm. C. Brown, 166 p., illus., \$2.50. Pictured-keys for determining many of the North American mosses and liverworts, with suggestions and aids for their study.

THE MARINE ANNELIDS OF NORTH CAROLINA—Olga Hartman—Duke Univ. Press, 53 p., paper, illus., \$1.

MEN UNDER STRESS—Roy R. Grinker and

John P. Spiegel—Blakiston, 484 p., \$4. Emotional effect of combat on our Air Forces.

RUSSIANS SAY IT THIS WAY—Dolly Gurvitch and A. Herenroth—Int Univ Press, 63 p., paper, illus., \$1.50. Ninety-nine Russian idiomatic expressions and their American equivalents.

TOTAL WAR AND THE HUMAN MIND—A. M. Meerloo—Int Univ Press, 78 p., \$1.75. A psychologist's experiences in occupied Holland.

UNITED STATES GOVERNMENT MANUAL, 1945—Office of War Information, Div of Public Inquiries—Supt. of Doc., 714 p., paper, \$1. Revisions through March 10.

THE USEFUL SOYBEAN, A Plus Factor in Modern Living—Mildred Lager—McGraw, 295 p., illus., \$2.75. A cookbook that tells the story of the soybean as well as giving recipes.

Science News Letter, June 30, 1945

Sodium metasilicate is an effective compound to clean glassware and make it brilliant and sparkling, it is the basic material in certain commercial products for cleaning glass.

VETERINARY MEDICINE

Rabbit-Killing Disease To Be Investigated

➤ RABBIT-RAISING, looked to hopefully by many persons as one ready means for relieving the meat shortage, is beset with its own difficulties, one of the most troublesome of which is a killing disease known to professional rabbit-raisers as "bloat", to veterinarians as enteritis. The cause is still unknown, all attempts to reproduce it experimentally have failed, and there is no known cure.

To deal with this profit-destroying situation, the Fish and Wildlife Service, U. S. Department of the Interior, has undertaken a research campaign which will be carried on at a special experiment station at Fontana, Calif., under the direction of Dr. Everett E. Lund. He will also study other rabbit troubles, especially lung and skin diseases.

Dr. Lund has already had considerable experience with rabbits. While a member of the biology faculty at Alfred University, Alfred, N. Y., from 1937 to 1944, he raised them on a semi-commercial basis, partly for classroom use and partly for sale.

Science News Letter, June 30, 1945

In the Physiologic Synthesis of Biocatalytic Substances

That protein may well be called the mother-substance of life, gains substantiation from its dual role in all organic economy: it is the primary constituent of all protoplasm, and also the essential "raw-material" and component of many biocatalytic substances concerned with vital metabolic functions.

Secretin, for instance, a polydynamic substance credited with enhancing the secretion of pancreatic juice, bile, and probably also of succus entericus, is proteinic in nature, a poly-

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Science News Letter, June 30, 1945

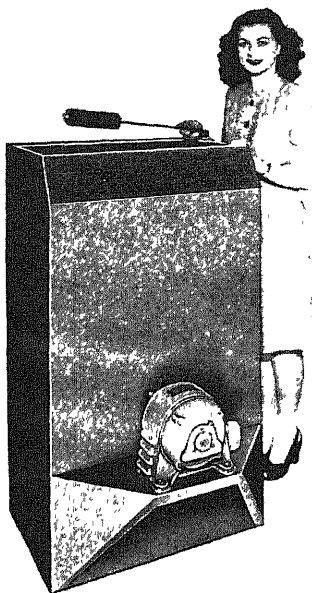
☼ **PRESSURE GAUGE** for diesel engines gives instantaneous reading of peak firing pressure and compression pressure. When the indicator stop is opened, admitting the pressure to the gauge, its pointer gives the proper reading and remains fixed until a release screw is turned.

Science News Letter, June 30, 1945

☼ **COCKROACH TRAP**, an inexpensive device, is made from a single sheet of material, stamped out and folded to form a box with square base and two triangular sides with flanges through which the insects enter. Food bait attracts them to a hinged shelf from which they are dumped automatically into a jar.

Science News Letter, June 30, 1945

☼ **DUST COLLECTOR** in the picture is a portable and self-contained unit that efficiently removes from the air, in factories and other establishments, all kinds of dangerous and obnoxious dusts. No collector bags are used. Tubular filter



surfaces drop the dusts into a pan in the bottom of the unit.

Science News Letter, June 30, 1945

☼ **CORD REEL** for the electric cable on a vacuum cleaner is mounted on the under side of the handle with the dust bag especially fitted to cover it. The improved reel, of light-weight plastic, discharges the cable through the hollow handle of the cleaner.

Science News Letter, June 30, 1945

☼ **TOBACCO PIPE**, in which no moisture collects at the bottom of the bowl, has a vertical pencil-sized well inside the bowl extending from the top to the pipestem. The smoke is drawn from the burning area through a slot in the side instead of through the tobacco in the bottom of the bowl.

Science News Letter, June 30, 1945

☼ **STAPLE PULLER**, to remove ordinary wire staples used to hold papers together, is a tool resembling an ordinary letter opener. It has two parallel wedge-shaped pieces on the top side which are inserted under the staple, raising it up while the flat lower side of the tool holds the paper from tearing.

Science News Letter, June 30, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N. St., N. W. Washington 6, D. C., and ask for Gadget Bulletin 265.

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